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ABSTRACT

In order to create a computer-literate elementary school, this practicum aimed (1) to provide information about computer-assisted instruction (CAI) to all kindergarten through grade 5 teachers while developing a prototypical classroom in grade 2; (2) to increase community awareness of CAI; and (3) to encourage quality networking among educators interested in CAI. Evaluation results indicate that all goals were attained: (1) The teachers became aware of CAI; (2) the grade 2 teacher received inservice training and experience promoting a leadership role in CAI; (3) the school's computer was utilized to assist instruction in curriculum areas; (4) the students became more computer literate; (5) the community became more knowledgeable about computers in education; and (6) a network circle of CAI leaders was formed. Related materials are appended, including questionnaires, tests, instructional materials, and newsletters. (Author/RH)

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NOVA UNIVERSITY

Development and Implementation of an Elementary School Computer Assisted Instructional Program

by

Freeman E. Baggett

Nova University
Cluster 10: Orlando

June, 1984

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ABSTRACT

This Practicum II addressed the problem of developing a Computer Assisted Instructional (CAI) at English Estates Elementary in Fern Park, Florida. The author of this practicum is the Principal of the school and wanted to establish a prototype CAI classroom to serve as a model for schoolwide CAI implementation to improve and increase basic skills mastery.

The major goal of this practicum was to increase knowledge of CAI in all teachers K-5 while developing a prototype classroom in Grade 2; to increase community awareness of CAI; and to create a quality circle of networking with educators interested in CAI.

The goals of this practicum have been met as evidenced by the results of student pre and post testing instruments in computer awareness and basic skills, teacher questionnaires, community inservice, evaluations and newsletters that concluded with a questionnaire on the value of CAI networking.

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CHAPTER I

A. Explanation of writer's role, responsibilities and work setting.

The author is employed by the Seminole County Public School System, Florida, as an elementary school principal at English Estates Elementary School.

English Estates Elementary serves as a Teacher Training Center for the University of Central Florida, Rollins College and Stetson University. It is this author's responsibility to supervise the student interns and to make recommendations to the teachers-in-training that would enable them to be potentially excellent educators.

The role of the principal has offered the opportunity and responsibility for continuous curriculum development, staff development and evaluation of both personnel and programs.

Following a 1981-82 state evaluation of English Estates, this school was cited as well above the national average in curriculum programs, skilled and dedicated personnel and high academic achievement by its students.

As a result of the writer's commitment to leadership in education, he was selected by United States Senator Paula Hawkins (Republican, Florida) to serve on the state committee for review and selection of candidates for appointment to the United States Service Academies.

He also served as chairman of the first educational specifications committee in Seminole County.

B. Description of community including sociological, geographic or other factors which contribute toward understanding the problem.

English Estates Elementary School serves a community situated in the south end of Seminole County, just east of Highway 17-92 and south of Highway 436. It is located on Oxford Road in the town of Fern Park, eight miles south of the County Seat in Sanford, Florida. The school was built for a capacity of 750 students; however, the present enrollment is 625. It is an area of declining enrollment.

The area is made up of a variety of dwellings: mostly single-family homes; a few condominiums; and some apartments. Two blocks northeast of the school (close to the center of the community being served) lies a concentration of businesses and a shopping center. The business area is expanding.

The population being served is economically and socially wide and diverse. It ranges from the upper middle class families to families in government-subsidized housing. Twenty percent of the students receive free or reduced lunches.

There is a good representation of many ethnic origins, and fifteen percent of the students are black, the majority being bused from another area. The remaining students either walk or ride bicycles to school.

The school has an excellent parent-teacher organization with a ten-year record of 100% membership. It is also the top Seminole County School in the number of hours parent volunteers serve their children at English Estates Elementary. For the past several years reported volunteer hours totaled over 12,000 hours, as compared to 4,050 hours for the next nearest school in time volunteered. In recognition of the school's volunteer program, it was selected to be visited by Adele Graham, the wife of Florida's Governor Robert Graham.

CHAPTER II. Study of the Problem

A. Problem Statement

It is almost impossible for an uneducated, inexperienced job applicant to find a good position in the computer age, employment and education experts say. In what is becoming a technological business world, workers must be proficient in communication skills, and technology especially computer literacy. Because of the shifting emphasis, education is changing. Many workers are returning to colleges and technical schools and studying specialized courses to maintain their employability. Florida schools and universities are becoming more rigid by requiring students to take a prescribed number of math, science and English courses and emphasis is placed on computer literacy, Grades K-12. Experts say it is important that students become familiar with computers as early as possible so they are not left behind when they become working adults.

Dr. Flora Pinder, coordinator of career planning and placement at the University of Central Florida, said math and computer familiarization should begin in elementary school. Making math a game for youngsters alleviates their fears of figures at an early age. The same theory works for computers. Early training is important, because so many math courses are required for a technical career that if a student has not taken them by college age, it could be too late to enter a chosen field. Teachers, parents and "the system" are blamed for a lack of emphasis on technology in schools. Students have not been pushed to read, write and learn with technology educators say. Lack of experience and education is a problem for older workers who find themselves out of touch with some of the changes taking place.

Carolyn Herrington, analyst for the Florida Education Planning Commission, said major companies rarely hire untrained or inexperienced workers. Businesses rely on the "education community" to provide the training necessary for jobs.

Business also depends on schools and universities to teach students to become competent in reading, writing and math, and this must begin in primary grades.

An inadequate educational system is the biggest impediment to the growth of high-technology companies in Florida, Harris Corp. vice president John Dawley said in a September 15, 1983 interview with Sharman Stein of the Orlando Sentinel newspaper. "Like many high-technology companies, we face a serious problem at Harris," Dawley said. "The educational system is not turning out the product we need."

In remarks before the Florida Industrial Development Council at the Hyatt Orlando, Dawley said 140 out of 600 college graduates recruited by Harris this year came from Florida universities. Florida students do not receive the education necessary to study electronics he said, and top-ranking Harris executives frequently find the state's school system inadequate for their own children.

Without enough educated employees, Dawley said, Florida cannot hope to build on its technology base. "We need to reallocate our resources with a sense of urgency," he said.

The subject of the Industrial Development Council's two-day convention was "Future Shock or Future Success? A Look at Florida's Sunrise Industries." Dawley, vice president of human resources at Harris, said American schools do not adequately stress science and math education. Competition with other countries could be hurt, he said, unless the United States begins training its children to become high technology workers.

Students do not necessarily have to know how a computer works, Dawley said, but they must know how to use it as a problem-solving tool. The biggest growth areas in industry will involve computers and the programs that control them, he said.

Vern Estes, General Electric's manager of robot applications, consulting and business development, touted the need for factory automation throughout American industries, saying it could mean the difference between life or death for certain businesses.

General Electric has automated its own plants throughout the country, and it is producing automation systems for sale. The former GE lamp factory in Plymouth, Florida currently is being transformed into an industrial robot manufacturing facility.

Increased productivity, quality enhancement and cost savings that result from automation can convert cutmoded plants into "factories with a future," Estes said. Without automation, American businesses cannot hold their own against foreign competition, he said. Students at a young age must begin to live in and with technology. It is problem solving, and learning to cope with a wide variety of problems, that is at the heart of education. The major steps involved in problem solving include:

1. Understand the problem. Here reading and

listening are essential skills, and overall general education plus common sense are important.

2. Figure out a plan to solve the problem, and represent the plan. Here thinking, drawing upon previous knowledge, and writing are essential skills. One (new) way to represent a plan is in the form of a computer program.
3. Carry out the plan. Often this is a routine and rote task. Speed and accuracy are desirable, while perserverence and attention to detail are often necessary. A computer may be quite helpful.
4. Understand the meaning of the results, check to see if they make sense, and make use of the results. This is a thinking task, drawing upon previous knowledge and one's understanding of the problem to be solved.

B. Evidence of the Problem

The concept of "computer literacy" is receiving much mention today. Over a period of time, a definition has been accepted as:

> Computer literacy refers to a knowledge of the non-technical and low-technical aspects of the capabilities and limitations of computers, and of the social, vocational, and educational implications of computers.

While such a definition can provide a focus for thought and discussion, it still does not pinpoint what is meant by computer literacy. Among other things it does not provide a measure of computer literacy nor a method for improving a person's level of computer literacy.

Computers are relatively new on the educational scene. The term "revolution" is frequently used to describe the past ten years in computer technology. Like many other high-impact or superlative words, "revolution" may be used more today than the facts justify. Still, what has happened to computers since 1972 probably has as much right to be called a revolution as anything else during the period. In the near future, computers will become a standard piece of equipment in the classroom. Educators do not believe there is now, nor is there soon likely to be, a revolution in the little red schoolhouse. The best educators can hope for is fast evolution. Education has never been known for its willingness to embrace new technology. When education has accepted technology, the promises made by the technocrats have rarely, if ever, been fulfilled. Educational television is a good example from our recent past. It did not revolutionize education as promised, but it is a tool that is sometimes useful for accomplishing some educational goals.

Many experienced teachers can list at least ten "new" ideas or new technologies that were supposed to revolutionize education. Yet many teachers still teach in much the same way they did 30 years ago. One can understand why educators aren't rushing to embrace new computer technology. In spite of the reasons why we won't see a revolution in education, there is a good reason to expect that education will evolve or change rather quickly during the next ten years. There are two main thrusts that will bring more change in the next decade than has occurred in the last 50 years: the meaning of learning and the computer. For most of the twentieth century, education has been institutionalized. Learning is something children do in a classroom supervised by one or more adults. The traditional school will not disappear, but before the end of this century it will likely play a much smaller role in learning than it does today. More people will spend a significant amount of time learning at home, in the office, and at learning centers. Increasingly, our society is viewing learning as a lifelong task rather than something children do to prepare for adulthood. That view is being accepted today because we live in a time of accelerated change. Information is outdated quickly; and new information seems to appear at a faster and faster rate. Secretaries must learn to deal with electronic calculators instead of mechanical ones, and factory workers have to learn about industrial robots. It's hard to find the mainspring in a digital watch and even more difficult to find the pilot light on a microwave oven.

The point is that each person must continue to learn, regardless of age, if he/she is to cope with the demands of life today, and that learning must occur someplace other than the classrooms where he/she spent the second grade. Fortunately, the small computer came along at a time when it can be particularly helpful in both traditional and nontraditional learning environments. Computers have been used in education for at least 20 years. Pioneering projects such as Suppes' work at Stanford University, however, used large, expensive computers which could not be placed in individual classrooms or resource centers. Instead, a keyboard/printer device called a terminal was placed in the school and connected to the computer by phone. This method was the only option available 15 years ago, and it is still a major means of getting computer-based learning into the classroom. (Kehrberg, 1979) Control Data's PLATO project is a sophisticated system of computer-assisted learning capable of teaching everything from pre-school letter recognition to graduate level physics. Another commercial venture, Computer Curriculum Corporation, uses large computers to distribute their educational programs to several hundred school systems.

In spite of the history of large computers as learning machines, the future of educatonal computing lies in the increased use of small computers. They are cheaper, easier to use, more reliable, and easier to install in a school. When faced with the choice of buying one large computer or 100 small computers, school districts are now frequently electing to buy small computers such as the ATARI 400 or 800, the Apple II, the PET, the Texas Instruments 99/4A, and the TRS-80 Model III. The small computers often cost far less than the price of a terminal for one of the larger systems. (Willis, Miller, 1981) Dependability is probably the second major reason schools are buying small computers. To use a time-sharing system requires a terminal that is working, a phone line that is reasonably clear of interference, and a remotely located computer (sometimes several hundred miles away) that is not only working but has the time to respond quickly to the student at the terminal. If any one of the elements in the chain isn't working, the entire system doesn't work and a scheduled learning period in the classroom is lost. The logistics of using small computers are much less involved and therefore inherently more reliable. A distinguished computer educator put the point very clearly in a recent article:

"The inexpensive microcomputer, more than any other event has made school-based computer education a possibility. The development of small time-sharing systems about ten years ago brought hardware costs per student terminal down to about $10,000 - a major breakthrough, but still far too costly for most schools. Worse yet, time-sharing systems lack robustness against hardware failure: 97% uptime is achievable and sounds good, but it means that there is no computer one day per month, and no computer class. The new personal computers have brought the cost down from $10,000 to $2000 and have increased robustness dramatically: 97% uptime for personal computers means that out of a collection of ten machines, nine are working all the time and all ten are working most of the time. Class goes on."

(Luehrman, 1980)

In working with government bodies, computer manufacturers, colleges, schools and, most important, children over the past twenty years, this author made several observations on education and learning. Some of these are not mine exclusively, but have been put forth also by groups and individuals such as the Cambridge Conference on School Mathematics (CCSM), the National Council of Teachers of Mathematics (NCTM), and Project SOLO.

1. Children's minds are unencumbered by constraints of what can and can't be done. Children will try just about anything.
2. Learning by manipulating, doing or discovering sticks with one far better than learning by reading about a subject.
3. "Learning to learn" is infinitely more important than learning facts and data.
4. Motivation of the learner is much more important than teaching method or style of delivery.
5. Thought-provoking activities should not be done as a special treat or reward, but sufficiently often that scientific thought will be habitual.
6. Thinking, per se, is worthwhile, particularly when it is in imaginative and creative directions. Rote attention to details is rarely justified.

7. Every child must be convinced that his thinking is worthwhile.

The test-teach method that is in effect in many classrooms at English Estates Elementary does not address the above observations on education and learning.

The problem this educator wishes to address is that computer assisted education is not happening at English Estates Elementary School. This author, in his role of principal, will ready his staff, parents and students for implementation of a computer assisted elementary school curriculum program. (See Appendix A for observation checklist on CAI.)

C. Causes of the Problem

Forward-looking curriculum researchers, educators and government administrators have known the benefits of using computers in the instruction process since the late 60's. Why then, you might ask, doesn't every child in every school in the world have computers available for learning? Teachers will say the lack of money, administrators will say the teachers aren't interested, the teacher unions will say there's no time for additional responsibilities, researchers will say it's lack of curriculum materials and software and government program administrators will say the proper objectives have not been established, and on and on. As in some multiple choice questions, the right answer is "all of the above."

Meaningful objectives probably are the best place to start. Objectives must be broadly stated and must not only be relevant to the world today but to the world of the future. Knowledge is changing and advancing so rapidly that we must expect objectives to change or, conversely, be formulated in broad enough fashion to keep up with technological advances. The Mager-style behavioral objectives don't begin to meet the need. Education today needs more than small behavioral steps. It needs objectives that are dynamic and can be expected to change over time and objectives that are stated in an entirely new way.

Objectives must be devised to lead young minds through an imaginative exploration of the jungle of political, social, psychological, and ethical issues that will confront them as adults. What is the objective that will foster decision-making under uncertainty? What are the objectives which elucidate the ways in which technology and values will interact in the world tomorrow? How does one measure whether one has learned to learn? These are the kinds of things upon which education must focus and the kinds of objectives that must be devised. Not only must objectives evolve; so must the teaching/learning process. It should no longer be a question of whether or not computers should be in the curriculum, but rather how many. The worth of the computer in the educational process has been proved hundreds of times in practically every discipline in every grade level. Prices of microcomputers are within department budget levels, indeed many PTA's and student groups have purchased computers for their schools. Consequently, today many former excuses for not using computers are no longer valid.

The computer is now being established in most school systems across the country. Instructional computer applications, computer literacy and computer use in school administrative functions have all attributed to the rapid expansion of computer technology within education. With the expense of computers no longer being an over-riding and limiting factor, we see another major problem to be addressed in computing educating -- teacher computer literacy. The vast majority of our teachers received their education prior to the microcomputer "revolution" and hence have had little or no formal training in computers. Currently most elementary public school students have no contact at all with a computer during their educational career. In relation to education the computer can be viewed in two general ways: as the focus of learning and as an aid to the learning process. The first view is embodied in the concept of "computer literacy." Arthur Luehrmann, in an article in Byte, (1980) made this observation: "Computing plays such a crucial role in everyday life and in the technological future of this nation that the general public's ignorance of the subject constitutes a national crisis.

The ability to use computers is as basic and necessary to a person's formal education as reading, writing, and arithmetic.....

Yet, despite computing's critical importance today, the overwhelming majority of this country's general public is woefully illprepared to live and work in the Age of Information as some have called it." Luehrmann makes the point many people are making these days: those of the next generation are going to have a hard time doing their jobs if they don't understand computers and how they are used. Even if computers could not be used to teach reading, math, and the other school subjects, they would be important as a topic of study themselves. Several computer manufacturers have gone to considerable lengths to provide books, computer-aided learning programs, and audio-visual aids in the area of computer literacy. Tandy, the manufacturer of the TRS-80 computer, has several training packages which can be used by teachers offering courses on computer literacy. Apple and Atari also have materials which can be used in the classroom or at home to learn about computers and their use. In addition, a variety of publishers are publishing both educational software and computer literacy books. Are You Computer Literate and A PET in the Classroom (both available from Dilithium Press) are examples. But much more needs to be done.

The second view of computers in education - the computer as an aid to learning other subjects - is just as important as computer literacy. The computer, particularly the small computer, offers both educators and learners unique features that help both deal with the demands of an information-oriented society.

Computers have been used in education in selected districts for many years. Early efforts grew out of the work of mechanical teaching machines and programmed learning - two movements that gained strength in the late 50s and early 60s and then subsided as problems and difficulties in application overwhelmed early hopes for the new methods. Computers were seen as one way to get around some of the problems of machines and programmed texts. Many programmed instruction books were boring. In addition, it was difficult to individualize instruction. Even if a student understood something the first time it was presented, the lesson might keep presenting it over and over. Or, if a student needed additional instruction to reinforce learning, the programmed instruction lesson might go on to new material. Early computer-assisted instruction did solve some problems, but it created new ones (e.g., reliability and costs) and was never accepted or used by even a large minority of the teachers and professors.

Reliability and cost factors are no longer the problems they were then. There are even a few major educational computing efforts at the state level. Funded by a forward-looking legislature, the Minnesota Educational Computing Consortium is one of the oldest and most successful projects. MECC began with the idea of using a large time-sharing computer that would be accessed from schools over phone lines. In recent years, however, their focus has shifted to the use of small computers. Some MECC's educational software is now marketed nationally. Other projects using small computers are underway in Alaska, Texas, British Columbia, and many other areas.

Computers are being used to teach basic academic skills as well as art, music, and creative writing. There is even a special language called PILOT which was designed specifically for educational computing. Computer-Assisted Instruction (CAI), Computer-Aided Instruction (CAI), and Computer-Assisted Learning (CAL) are all terms in general use that refer to the use of a computer in education. Although some authors have tried to give specific meanings to each term they are usually used interchangeably. Several more terms such as Computer-Managed Instruction (CMI), Drill and Practice (D&P), and Simulation refer to specific types of computer-aided learning. Most elementary school teachers are people-oriented. They are vitally concerned with children, in helping children to develop their potentials and to learn. It is not surprising, then, that many elementary school teachers view computers and calculators with suspicion. Will computers help students to learn more, better, faster? Will use of calculators lead to a better understanding of mathematics and increased problem solving skills? Will machines dehumanize education and replace teachers? Probably the answers to these questions are both yes and no. Much depends upon the teacher, the student, the equipment, the instructional materials, and so on. The knowledge, attitude, and skills of the teacher are apt to be the dominant factors.

Perhaps the most difficult questions have to do with what children should learn to do mentally, what they should learn to do using books, pencil and paper, and what they should learn to do using other aids such as calculators and computers. The capabilities of these electronic machines continue to grow rapidly and their price is now quite affordable. Thus the whole content of the elementary school curriculum needs to be rethought, and substantial revision may be necessary.

The administrator, faculty and staff at English Estates Elementary School had been stressing the basic reading and math skills in the classroom; staff development demonstrating various teaching strategies that include modality instruction with concentration on hands-on and tactile approaches; career education; screening procedures and identifications of the Learning Disabled student and how to address his/her needs in the regular classroom; and children's liteeature as a total part of the reading program. Computers in education was not a major concern.

As a result of staff development needs assessment and observation, CAI in 1983-84 was the main concern to be addressed at English Estates Elementary School.

D. Relation to Literature

Why should the computer be singled out as the one device that must be incorporated into the curriculum? Why not the videodisc, tachistoscope, or portable conference telephone? Because computers are profoundly different from any previous or current device or innovation.

Art Luehrmann (1980) likens computers to the development of reading and writing, because computing constitutes a new and fundamental educational resource. To use that resource as a mere delivery system for instruction, but not to give the student instruction in how he might use the resource itself, has been the failure of the CAI effort. What a loss of opportunity if the skill of computing were to be harnessed for the purpose of turning out masses of students who were unable to use computing!

Over the last decade, American education has come to face a number of new demands that must be met with limited resources. Many of these new demands arise from the rising dependence of our society on technology as a basis for domestic economic growth international competitiveness, and national security. In October 1980, the House Committee on Education and Labor, its Subcommittee on Special Education, and the Subcommittee on Science, Research, and Technology of the House Committee on Science and

Technology asked The Office of Technology Assessment (OTA) to examine the extent to which information technology could serve American needs for education and training.

Their report documents two basic sets of conclusions:

1. The so-called information revolution, driven by rapid advances in communication and computer technology, is profoundly affecting American education. It is changing the nature of what needs to be learned, who needs to learn it, who will provide it, and how it will be provided and paid for.
2. Information technology can potentially improve and enrich the educational services that traditional educational institutions provide, distribute education and training into new environments such as the home and office, reach new clients such as handicapped or homebound persons, and teach job-related skills in the use of technology.

The OTA report provides an overview of the issues relating to the educational applications of the new information technologies. It examines both the demands that the information revolution will make on education and the opportunities afforded by the new information technologies to meet those demands.

Rather than focusing on a single technology, it examines a wide variety of new information products and services such as those based on the combined capabilities of computers, telecommunications systems, and video technologies. Similarly, the report surveys a broad range of educational providers, and examines how the application of information technologies may affect their abilities to provide education and their respective educational roles. (See Appendix C for Informational Technology and Its Impact on American Education Advisory Panel) The review of literature presents a series of case studies exploring the applications and uses of technologies in a variety of institutional settings. All were chosen to depict current, state-of-the-art uses within institutions where application has been successful.

These cases were also selected to cover a variety of instructional uses of computers; computer literacy, computers as instructional delivery systems (CAI-CMI), and computers as tools for problem-solving.

The Computers in Education program of the Lexington, Mass., public schools was selected for inclusion because the district is considered to be a leader in the application of computer technology, with experience and expertise that spans over 15 years.

Located next to Route 128, the home of a thousand high-technology companies, the district typifies a community where parents' technical expertise, leadership, and support have had a significant impact. The Lexington experience illustrates a variety of computing applications, developed by individual teachers with leadership from the district's long-range planner and computer specialist. The program also demonstrates a major planning effort involving teachers, administrators, and parents. This 2-year effort has resulted in a comprehensive blueprint for computers in education that depends on the district's continued ability to handle financial constraints (Proposition 2-1/2) through frugal budgeting, redistributing available funds, and forming new partnerships with the community (town government) and the private sector. Lexington, one of the suburban towns that surrounds Boston, is located in the heart of the State's booming high-technology area. Many of the Lexington parents and community members are employed by the nearby technology industries in white-color technical and managerial positions. There has been continual and strong community involvement and support for the schools, with a tradition of community participation in town governance and decisionmaking. Contrary to trends in other districts, 90 percent of Lexington parents send their school-aged children to public schools. Assistant Superintendent Geoff Pierson observes that the flight to private schools has not occurred because "there is consensus about what the schools are doing and parents feel that the schools represent their children's interests." Lexington is also a relatively homogeneous, affluent, middle-class community. The school-aged population is 95-percent white, 3-percent black, and 2-percent Oriental. Seventy percent of high school graduates go on to a 4-year college. Lexington boasts of having the largest number of merit scholars in the area, in part because there are many "smart kids" in the system, but also because "our program is rigorous and interesting."

A total of 5,625 students are enrolled in grades K-12 in seven elementary, two junior high, and one high school. Five years ago, the district, accurately projecting serious enrollment declines, planned and prepared for significantly fewer students. Over that period five schools were closed and 150 teaching positions were abolished, while teacher/student ratios were held constant and the number of instructional programs was increased. According to Superintendent John Lawson, declining enrollments, continuing inflation, and the passage of Proposition 2-1/2, resulted in the allocation of fewer resources to the public sector.

However, Lawson states that the school administration and the school committee have avoided serious problems by planning carefully and spending frugally, "In an era of limited resources we have had to develop better priorities, monitor our successes, and determine where we want to go next." Not all parents and staff have been happy with the budget decisions and allocation of resources, but they agree that Lexington has fared better than other districts in the State. There is consensus that the over $17 million 1981-82 budget, with a $3,024 per pupil expenditure, supports a comprehensive, high-quality educational program.

The district's first computer, a Digital Equipment Corp. PDP-8 with 14 terminals, was purchased with Federal funds by the mathematics department in 1965. Math-related computer courses were first offered to high school students, and a year later to junior high school students. As teachers and students became involved, interested parents worked with them to develop software, to expand programing skills, and to train others.

Parents soon began to push for computer use in the elementary schools, locating unused terminals at work, donating personally owned equipment and helping the schools get the hardware installed. In addition, parents and math specialists trained teachers. Because teacher acceptance and use of computers was minimal, parents took over operation of the terminals and trained additional parent volunteers to enable pupils at all elementary schools to participate. These computer activities continue to build general computer awareness and comfort and to engage students in problem-solving activities, drills, and games. When microcomputers came on the market, the Lexington computer activitists were ready to move.

Workshops and training sessions followed that were intended to provide most of the staff some training, at least at the awareness level. Teacher participation has so far been voluntary. All of the district's library media specialists have had extensive training and, as a result, have initiated several projects: a computerized annotated listing of 16mm films; a materials data base for all nonprint materials in the district; and a computer center/library media pilot. The media Specialist's role has expanded in Lexington; in recent budget planning sessions library positions were held constant, partly because of the school committee's commitment to computer activities and because of the plan to focus computer centers around the media center.

Currently, the district's 60 microcomputers, 2 minicomputers, and 33 terminals support the following uses:

Kindergarten - Grade 3

- Reinforcement of number and letter skills
- Computer awareness and independence
- Phonics instruction
- LOGO models
- BASIC for primary grades

Grades 4 - 6

- Word processing for editing
- Using terminals in the classroom
- LOGO
- Skills reinforcement

Parents have participated in the computer activities and served as a resource by:

- providing technical advice and assistance. Parents serve on advisory and hardware purchasing committees, help install equipment, troubleshoot problems, and support computer plans in school board deliberations;
- writing educational software for the time-sharing system and the PET microcomputers and by inputing data in the materials data base;
- helping train students, teachers, and other parents on the terminals. Parents help in individual classrooms using microcomputers, and participate in district-level workshops;
- assisting with computer clubs before and after

school;

- supervising the use of the time-share terminals in the elementary schools; and
- purchasing and donating equipment. PTAs raised funds to purchase additional microcomputers. Other parents donated personally owned computers and terminals or found excess equipment that was no longer being used by companies.

Final evaluation concluded that students are motivated and interested in computers, and there is evidence of improved student performance through skills reinforcement drills. But the existing software for the minicomputers and microcomputers, obtained through commercial sources and parent, teacher, and student development, is limited in scope. Although high-quality software is becoming available, it is very expensive. The LEADS system has both management and instructional applications, but its users are primarily central office staff and special education staff. Its potential for diagnosis and tutoring applications and materials retrieval, however, is high. According to school officials, what is needed to make LEADS fully operational is an upgraded minicomputer, a unified distributive network, and training for both administrators and teachers - to be implemented during the second year of the long-range plan.

The second case study that this author researched is a computer assisted program in California.
The Silicon Valley and nearby communities were selected for study because the area provides a rich source and critical mass of educators, schools, students, parents and community members, and business representatives directly involved with technology. The area is the center of the Nation's semiconductor industry. It is also the home of a growing number of educational experts and leaders in computing. There are many examples of locally developed projects sprouted by individual teachers or administrators or parents, which have developed into major programs affecting an entire districts' students and staff. These activities involving computers in classrooms also demonstrate how resources - local, State, and Federal funding, as well as parent and local experts and the private sector - are critical to implementation.

Computer-Using Educators (CUE) is a support group organized by and for K-12 teachers, teacher trainers, and others interested in the use of computers in education. Started by 12 teachers in the spring of 1978, the organization has mushroomed to a membership of 3,500, primarily in California but also in 48 States and 13 foreign countries. Its growth reflects the phenomenal growth of educational computer applications and mirrors the grassroots development of programs in schools up and down the San Francisco Bay Area. Groups modeled after CUE have also been formed throughout the country.

Through conferences, newsletters, and meetings, CUE is a source of information and a vehicle for sharing experiences with computers, and their use in education. In addition, CUE members originated and now support the Microcomputer Center and SOFTSWAP Library of public-domain microcomputer software housed in the San Mateo County Office of Education. To quote one member:

> Learning is a never-ending process. Formal education is a small portion of this ongoing process. The role of educators is to aid the learning processes. The philosophy of CUE should be to show educators - mostly by example - the role computers can play in the learning process. Computers can be used in many ways to do many functions. The uses, functions, methods, and materials will change and evolve. CUE can help discover and show the way.

The expansion of CUE membership and activities demonstrates not only the growing interest and use of technology in schools, but also the fact that teachers need help. They are coming for more than help, some argue - they're looking for leadership. These computer-using educators "are carrying the message that the time to move is now," notes Arthur Luehrmann, former director of the Lawrence Hall of Science Computer Project. "The leaders are here in these counties who are responding to the signals coming from society, from the employers, and parents."

In addition to the first priority of an increased commitment to mathematics, science, and computer instruction in California K-12 schools, the State Education Agency is beginning to address technology issues. One issue that concerns many of the local educators is how to meet these commitments, given the growing disparity between districts that have programs, trained teachers, and community resources to draw on and those districts that do not. Furthermore, not every district or county in the State has a major industry to draw on. Even in the Silicon Valley much of the private sector is made up of small, short-term, entrepreneurial businesses that don't have the extensive resources.

In reflecting on the grassroots development and the enthusiasm of CUE, Joyce Hakansson, formerly at the Lawrence Hall of Science and now a software designer and developer, cautions: "We need to understand the place of technology and give it a proper role. Don't assign all of our ills to technology...recognize that technology is just another tool." Hakansson notes the new status and positive feelings of self-worth resulting from interaction with microcomputers, but also observes that, "software, the essence and heart of the computer, is less than it could be" and that "what youngsters are doing on computers may not be worth the time or money." The future applications ought to capture the inherent interest and motivating aspects of the technology and match it with children's learning needs - to integrate computers into the teaching and learning environment.

In the Cupertino Union School District in Cupertino, California, a study shows a unique inclusion of a CAI program.

At Muir Elementary School, computers can be checked out to parents and teachers; every weekend they are all checked out. Because the computer in the library is used nonstop, access for many students is a problem. At the parents' insistence, two introductory workshops were offered to parents. The school plans to use parent volunteers to teach computer literacy curriculum activities during alternate library periods. In this school, parents will become a major force as volunteers in the program. At the West Valley Elementary School one super parent, Cheryl Turner, became a catalyst and prime mover in establishing the school's computer literacy program. The program began with enthusiastic teacher and student response to Turner's demonstration of a computer she had made from a kit. With strong support from the principal, microcomputers were installed in the library media center and Turner was hired as an aide to teach computer literacy. Funding for the microcomputers came from the PTA, a grant from the INTEL Corp., and MGM funds. A parent, an Atari executive, arranged for a loan of an Atari to the school. All but two teachers wanted their students to participate in the program. Turner, who has "had a fascination with computers for 20 years enjoys being a role model for the students at demonstrating, especially to the girls, "that it is okay to enjoy electronics and run around with a screwdriver in your purse."

The computer literacy program has energized both teachers and their students. Individual parents have been tremendously supportive, although by and large Cupertino does not benefit directly from proximity to the corporate world and Silicon Valley industries.

The technology training and education programs of the Oxford Public Schools were selected for study because they provide an example of how a small, rural school district with limited local funding resources can offer up-to-date education and training opportunities to its students and adults in the community through partnerships with private industry and other rural school districts. This third study also provides an example of the impact of Federal and State grants on the implementation of new programs. Although each grant was relatively small, "to Oxford they looked like a Hope Diamond," according to the Superintendent.

Originally a French Huguenot settlement, Oxford was founded more than 300 years ago in central Massachusetts, approximately 20 miles south of Worcester. Once the center of a thriving mill industry, Oxford's economic base seriously declined as the mills closed. At present only one small mill operates; it employs five people. No new industries have been established. Oxford's population of 11,450 is primarily blue-collar. In 1980, Oxford's annual per capita income was $6,582. Of the adult working population living in Oxford and surrounding similar communities, 60 percent are semiskilled or unskilled workers and 11 percent hold professional or managerial positions.

The Oxford Public Schools serve 2,460 students in grades K-12 who attend three elementary, one middle, and one high school. Almost all students are white; fewer than 1 percent are black, and fewer than 1 percent Hispanic. Of the high school graduates, 30 percent attend 4-year colleges, while another 30 percent go on to community college and vocational training institutes.

The development of CAI in this district was unique because it chose to design a mobile computer bus with $100,000 worth of equipment to be loaned to each school at an assigned time. Both teachers and students had opportunities to use the mobile computer lab to develop computer awareness and skills. Upon assessment of this program, school board members, parents and students say again and again, "What a difference the technology programs have made." Parents describe changes in their children and indicate that they are now interested, know what they want to do with their lives, and have made complete turnarounds. What appears to be most important to the community is that these students have goals and some have employable skills. High school principal, Bacon explains: "They (parents and students) know that computers are the 'in' thing in Massachusetts."

The fourth study is the Houston Independent School District (HISD), a recognized leader in urban education, in developing innovative programs such as magnet schools and in implementing cooperative efforts with industry and the business community. It has successfully halted declining pupil achievement, a major problem for urban school districts. The district also provides examples of how technology can be used to support and deliver basic skill instruction, to communicate with parents, to assist teachers, and to become the basis for technological understanding and computer literacy.

Moreover, it provides an example of districtwide leadership and coordination through a newly created department of technology and the Nation's first associate superintendent for technology.

The Houston metropolitan area population in 1981 was 2.4 million. It is a highly mobile population with a high growth rate for Hispanics and Asians. A total of 193,702 pupils attend 169 elementary and secondary schools. Over the last 10 years the ethnic makeup of the student body population has shifted from an almost all-white population to one that is 23 percent white, 44 percent black, 30 percent Hispanic, and 3 percent Asian. Approximately 62 percent of the high school graduates attend college.

Houston is at the center of a booming industrial area. Its major industries are oil and gas, banking, construction, and chemicals. There are strong ties between HISD and area industries, the chamber of commerce, and the other business organizations. This relationship has been cultivated by Houston's superintendent, Billy Reagan, over a 7-year period. Through cooperative business/school arrangements, the district's pupils and programs have benefited. For example, magnet schools receive hundreds of thousands of dollars for equipment and scholarships from companies such as Exxon, IBM, DuPont, and others. There is evidence that the district's focus on technology utilization, academic achievement, and career training programs has been positively received by the business community.

By October 1981, the district survey of microcomputers reported 200 microcomputers located in 47 percent of HISD campuses. The most frequently used system is the Apple II, 48K. Local funds were used to purchase 45 percent of the microcomputers in the school buildings, while Federal funds paid for 31 percent. Parent-teacher organizations bought or helped to buy about 4 percent of the systems. Of those reported uses, 44 percent focused on classroom instruction; 29 percent student achievement. The profile of HISD elementary students' mean composite scores from 1971 to 1981 documents the increased basic school performance of a student population who typically are low achievers. In 1980-81, the district completed its sequential testing program through grade 12. Although the results at the elementary level are more impressive, scores in grades 5, 7, 8, 9, 10, and 11 also show a significant improvement in achievement. Although not the sole factor, technology plays a critical role.

When the title I computer-assisted instruction (CAI) program was evaluated, students in grades 2-6 averraged gains of 1.1 months in reading and 1.2 months in mathematics in 1978-79. Students in grades 3-7 made similar gains of 1.1 months in reading, 1.4 months in mathematics, and 1.5 months in language in 1980-81. Of teachers whose students participated in the CAI labs, 93 percent felt that student performance improved as a result of CAI and 63 percent reported that students' achievement was greater than would be expected in a traditional instruction program. While students looked forward to CAI classes, teachers complained about the disruption to their classes when students were pulled out. Scheduling was fixed and inflexible. Moreover, when computers were down or telephone lines malfunctioned students missed instruction.

Operation Fail Safe was evaluated in 1977-78 to determine the relationship between parent involvement and student achievement. The level of parent involvement, determined by the school principal, was compared with students' achievement test scores. At every level - elementary, junior high, and senior high - a significant positive relationship was documented. A second study of a pilot parent-assist program involved 200 parents of third grade students in four schools. After students' reading skill areas were identified, materials were prepackaged and distributed weekly for parent-child use at home. A comparison of these students and a control group (students not participating in the program) revealed higher significant gains for pilot students. Beyond these statistical gains, Operation Fail Safe has the strong support of the business community. Local businesses and corporations have paid for a $1 million advertising campaign that highlights parent involvement activities with the message, "Don't Fail Me - Help Me." Seventy-four percent of elementary school parents and 39 percent of secondary school parents attend the program's parent-teacher conferences.

HISD and the Region IV ESC have provided leadership for the 101 local area school districts and for the State education agency. The Apple microcomputer bid process and contract had national recognition and was used as a basis for other district and regional education agency efforts. Region IV was one of the first to join the Minnesota Educational Computing Consortium (MECC) as an institutional member, providing area schools access to MECC-produced software.

HISD organized a technology conference for the National Institute of Education's Urban Superintendents Study Group in December 1981. The conference brought together educational leaders, hardware manufacturers, and educational publishers to discuss common needs and to work towards collaborative efforts.

Finally, the district is bombarded with requests for information and for help - "everything you know about computers." There is a steady stream of visitors who come to observe programs and see teachers and students in actions.

The fifth and final study to be included in the Review of Literature is the LEARN/ALASKA computer program.

The LEARN/ALASKA network and the ETA projects have been implemented in the past 2 years and are just now beginning to be used operationally. The impact of these systems on education will not be observable for some time. There appear to be no plans by the agencies involved to monitor or evaluate the impact of these systems.

Knowledgeable persons in Alaska make the following kinds of predictions of the impacts of computer and communications technologies on education:

- curricula of small schools will become more standardized through use of the IST courses;
- nonschool-based education, such as correspon-

dence courses, will become more important;

- individual schools, as opposed to school districts, will assume greater decisionmaking control;
- previously isolated cultures will become more socially sophisticated;
- native languages will disappear; and
- cultural barriers to educational progress will be overcome.

The increasing use of audio conferencing is rendering obsolete some institutional mechanisms and jurisdictional boundaries. Communications networks cut across school district and State lines, raising issues about institutional jurisdictions over accreditation of courses, tuition payments, school schedules, and the like.

Through their varied experiences in the implementation of computer and communications technology in education, Alaskans have addressed issues of design, implementation, and public policy that very likely all Americans will eventually have to address. By no means have all these issues been resolved in Alaska, but there is a more mature understanding of them now than 10 years ago.

- What are the risks involved in technological innovation, and how might they be minimized? According to a model being developed at the

Center for Cross-Cultural Studies at the University of Alaska, the risks of wasted capital investment and undesirable cultural side effects can only be minimized if systems evolve with a high degree of user control over growth rate and direction.

- Should the cultural and other impacts of innovation be monitored and, if so, how? There is no formal mechanism for monitoring impacts and outcomes in Alaska. Some believe there is no point in it; others are concerned over our lack of understanding of impacts.
- What is the appropriate role of State Government is delivering instruction -e.g., via television or computer-assisted instruction?
- By what mechanism can educational needs be taken into account in the processes of establishing policies and regulations regarding telecommunications?
- How can educators and users drive the design of innovations?
- How can development of high-quality, user-relevant programing be financed?

Increasing use of computer-assisted instruction is highly likely in Alaska. The Report of the Governor's Task Force on Effective Schooling recommends "computer-assisted instruction as a viable means of enhancing schooling with respect to the development of skills and acquisition of content."

Application of video disk technology, combined with microcomputers, is planned. The Office of Planning and Research in the State Department of Education has established a design team to analyze authoring systems, assess feasibility of group interactive video disk systems, and prepare recommendations for applications to instruction.

Audio conferencing will be combined with instructional television to provide interactive courses. Students watching an instructional television program will be electronically linked together and to the instructor, thus providing a technologically advanced kind of correspondence course.

University students in Alaska will have increasing access to courses at out-of-state institutions via computer and audio conferencing systems.

Further research by this author resulted in an examination of current material available for CAI both for development and implementation.

INTRODUCE YOUR STUDENTS TO THE VOCABULARY OF COMPUTERS

Microcomputers Can Be Kidstuff:
A Friendly Guide to Using a
Micro in Your Home and School
by Anna Mae Walsh Burke (1983)

Use this book to orientate students to computing. It presents a clear, nontechnical overview of types of computers and how they are used.

The section on programming logic is invaluable. It sets the stage for learning Pilot and BASIC, later discussed in their own chapters. Easy programs are listed so students will be successful programmers the first time!

THE ALPHABET ACCORDING TO 'COMPUTER-ESE'

The Computer Coloring Book:
It's Not Just a Coloring Book!
by Freedman, Morrison and Nones (1983)

Has more than just pictures to color. There are 25 clearcut definitions of such terms as Analog, Byte and Computer. Just the thing for reducing 'computer phobia!'

This is a nonthreatening mini-course in the orientation to computing. These definitions are simple and clear. Students can discover the language of computing.

EXPAND YOUR STUDENTS FAMILIARITY WITH COMPUTERS

Are You Computer Literate?
by Billings and Moursund (1979)

This general, nontechnical introduction to computers and computerization offers you a springboard for exploring the possibilities and problems of computers. You don't need any previous experience with computers - or even have a computer at hand - to learn from this book. All information is presented in a readable, friendly style. Read about the history of computers, programming, assembly line robots, simulations, computer careers... current topics important to your studies.

HANDY REFERENCE FOR YOUR STUDENTS

Illustrated Computer
Science Dictionary
by Donald D. Spencer (1982)

Here are the most significant terms related to computers in easy-to-understand language. Each definition is brief, to-the-point, and written in words your students can cope with. Also includes biographical information on famous people in the history of computers - Pascal, Grace Hopper, and others.

COMPLETE TEACHER'S GUIDE WITH ACTIVITIES AND RESOURCES

Teaching Computer Programming
to Kids and Other Beginners
by Royal VanHorn (1983)

Here's everything you need to design and teach computing to youngsters from grade 2 on up. Part I is a complete teacher's guide to Computer Programming for Kids and Other Beginners (all hardware edition). Part II is chock-full of teaching methods and activities. Part III is an invaluable collection of resources for teaching programming. You will find this a useful management resource regardless of the student text you use. Features transparency masters!

EVERYONE'S BASIC PRIMERS

Kids and the Apple
Kids and the Atari
Kids and the TI99/4A
Kids and the VIC
by Edward H. Carlson (1982,1983)

These step-by-step manuals are written primarily for youngsters from 10 to 14, but everyone will love them. Abundant cartoons, simple instructions, and self-tests make learning fun and effective.

The feature called "Instructor Notes" which begins each lesson, contains a preview and teaching tips for parents and teachers.

COLORFUL PICTURE BOOK TELLS YOUNG GIRL'S COMPUTER ADVENTURE

Katie and the Computer
by Fred Dignazio (1979)

You can introduce computer technology with this book written for young children. Like Alice in Wonderland, Katie travels into the world of a computer. Your younger students can learn about bytes, chips, RAM, and ROM in an enjoyable way. Full-color pages keep their interest.

EASY-TO-UNDERSTAND GUIDEBOOK TO COMPUTERS

Discovering Computers
by Mark Frank (1981)

This comprehensive book introduces students to computers - how they work, what they can do, even how

they make mistakes.
Full-color photographs and clear illustrations help clarify complex ideas. Readable format, glossary, and an index listing of 164 topics make this an excellent reference for student reports or a text for computer literacy.

COMPUTER ABCs FOR YOUNG LEARNERS

Computer
Alphabet Book
by Elizabeth S. Wall
(1979, 1982)

A is for address, B is for BASIC, C is for Computer! You can present the world of computers to young students. This picture book connects the letters of the alphabet to simple definitions of computer parts and terms. A little blue elf prances across the pages in drawings that offer a visual clue for each word.

VALUABLE COMPANION FOR BEGINNING USERS

Computer Literacy:
Problem-Solving with Computers
by Horn and Poirot (1981)

Here's an encyclopedia for computer novices. Chapters cover computer jargon, history, applications, occupations, systems, and components. Includes clear definitions, illustrations, photos, and flowcharts, and end-of-chapter exercises.

APPLICATION-ORIENTED INTRODUCTION TO MICROCOMPUTER USE IN SCHOOLS

Using a Microcomputer
in the Classroom
by Bitter and Camuse (1983)

For teachers, administrators, and parents, this guide discusses different types of computer-assisted instruction (CAI), selection of hardware and software, and in-class computer applications. Includes a resource section of books and magazines, films, and other teaching/learning aids and is a comprehensive look at computer use K-12.

DON'T (OR HOW TO CARE FOR YOUR COMPUTER)

by Rodnay Zaks (1981)

This is a reference for all educators who have, or will have the responsibility for a computer system. Recommendations on what to do when something does go wrong, plus tips for safety and security precautions.

There are several advantages of computer teaching over the conventional classroom. Classroom teaching must be instructor-centered so that students have to proceed at the speed and level of complexity of the instructor. Brighter students find the pace too slow and are bored, while those not-so-bright often become lost or fail to understand part of what is said. Any student can miss sections through lapses in attention. But with computer assisted education, the process is pupil-centered, and the machine adapts its pace to that of the student. The slow student can ask for endless repetition without embarrassment, and the machine will retrace its steps with infinite patience. On the other hand, the quick student can skip a segment with the machine questioning to check that he/she does, in fact, know it. With a well-produced CAI program, the student is unlikely to become bored or distracted. The machine will be programmed to ask frequent questions and grade the difficulty of its demands according to the ability displayed. If a long time is taken for a reply to a question, the program can send prodding messages. The student cannot race ahead without a true understanding of the material because the program constantly examines the level of understanding.

The computer can also free the teacher from certain tedious chores, allowing more time to spend in personal interaction with students. Even though most students are attracted to the computer because it is a refreshing change of pace from normal modes of instruction, this human contact offered by the teacher is still the most important element in stimulating creative abilities.

There are major problem areas related to the application of computers in education: (1) facilitating man-machine communication, (2) cost efficiency, and (3) user acceptance.

Two factors make it difficult for people to communicate with machines. First, the terminals are not appropriate for some educational applications and, second, the language that a computer understands is not appropriate to the user. The most popular input/output device is the terminal or CRT. The cathode-ray tube tends to have poor resolution and may be difficult for young children to read for extended periods. The best might be the Non-impact printer which makes use of electrostatically charged ink sprayed on paper because it is fast, quiet, and easy to read; but it is still too expensive. Fairly good sound quality is available in computer-manipulated vocal sounds; the technique is used in such applications as telephone number references and in bank account or charge account verification systems.

Computer programmers become quite skilled at computer languages, but are often not qualified to write effective CAI programs. Languages that are easier to use have had to be developed for teachers who wish to write CAI programs, but who know little about computers or programming. Professional educators, not programmers, will have to raise the standard and improve the style of computer assisted instruction. (Moursund, 1981)

Upon investigation of the review of literature on CAI, this author developed four key ideas of the computer capabilities and its educational implications. They are:

1. A computer can store a very large amount of data - useful in solving a wide variety of problems.
2. A computer can automatically follow a very long and very complicated set of directions specifying how to solve a certain type of problem. Large libraries of such computer programs are now readily available.
3. A computer is very fast. Even the least expensive computer can carry out many thousands of program steps per second.
4. A computer is a general purpose aid to problem solving. It is a useful tool in every academic discipline.

This last point is very important to keep in mind.

Educators understand and accept that reading and writing are general purpose skills, and that pencil and paper are a general purpose tool. Eventually computers will gain a similar level of acceptance, and skill in their use will be expected of all educated people.

At one time calculators were quite expensive, and consequently their potential impact upon elementary school education was low. It was unthinkable that students be given significant access to calculators costing $1,500 apiece, when most adults could not have similar access. Now, of course, calculators are commonplace in homes, stores, and wherever calculation needs to be done.

Some people are not willing to accept the computer as an aid for instruction. They may claim that extensive use of computer technology may lead to impersonalized teaching. This could happen, but it is very likely that it will make learning and teaching more personalized because computer systems will be able to offer highly individualized instruction. Another common claim is that widespread use of computers will lead to excessive standardization of education. Again this is a possibility, but it can provide a means of raising educational standards in schools. More importantly, the wide use of computers can introduce a wide variety of educational and intellectual experiences. Finally another opposition is that CAI will bring us closer to becoming slaves of machines. However, computers can free students from the drudgery of doing exactly similar tasks that do not fit their individual needs. It should be emphasized that while some subjects lend themselves well to computerized teaching, others may not. Computer assisted instruction will never replace the human teacher. It is up to educators to recognize both the usefulness and limitations of computers in education.

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CHAPTER III

A. Statement of General Goals

This practicum was designed to improve and increase academic mastery with computer literacy in the students of grade two (2) at English Estates Elementary School by utilizing Computer-Assisted Instruction. For this goal to be achieved it required:

1. That teachers become knowledgeable of teaching strategies that utilize computer instruction.
2. That parents develop an awareness of computer assisted instruction.
3. That students become knowledgeable of using the classroom computer (Apple IIe).
4. That a network system begin among elementary educators and administrators in order to assist one another in developing computer assisted curriculum.

B. Terminal Objectives

GOAL	ACTIVITIES	EVALUATION INSTRUMENT	TERMINAL PERFORMANCE
Teachers			
To become computer literate	Staff Development	Pre and Post Assessment Questionnaire	75% of the teachers will become more knowledgeable of computer assisted instruction
To utilize computer assisted instruction for curriculum development	Computer management design for individual student remediation utilizing commercial software	Level tests developed by Seminole County	Individual computer student Educational Plans for students needing assistance
Students			
To increase computer literacy	Hands on computer experience	Pre and Post test on computer knowledge	30% gain made by all students
To increase academic mastery	G. 2 curriculum	Pre/Post test on basic academic skills	An individual 5% gain in the CAI class when compared to the Gr. 2 class not utilizing CAI

Parents/Community			
To become knowledgeable of computers in education	Workshop	Evaluation questionnaire at conclusion of workshop	35% of respondents stating that workshop helped increase computer awareness and knowledge of CAI
Educators			
To bring together educators outside English Estates Elementary school to share computer curriculum design	Newsletter sent out by this author to at least three schools in the Central Florida District	Evaluation questionnaire	35% of respondents stating that networking is helpful

C. Description of Evaluation Instruments

The second grade students took a Diagnostic Tool in academic skills that correlates to the Florida State Assessment Test. This is a Seminole County test that addresses basic skills in Reading, Writing and Math. (See Appendices D, E and F)

The grade 2 CAI class was given a pre and post test on Computer Awareness. This test included computer terms such as "hardware," "software" and "cursor." The student should know what a floppy diskette is as well as LOGO, Apple II, LISA, and Atari 1600 and Tr80. (See Appendix G)

The teachers of the school completed a questionnaire on the value of CAI inservice, the grades that should have computers, the reason why we should have CAI, etc. (See Appendix H) The teacher implementing CAI was administered an 18 question evaluation about inservice, CAI planning time, use of CAI as remedial, tutorial, or simulation. (See Appendix I)

This author periodically assessed the CAI classroom to observe students working on the computer. (See Appendix J)

The parents were requested to complete an evaluation sheet on the CAI workshop and if they felt that CAI should be in elementary school. (See Appendix K)

D. Plans for Analyzing

This author had two classes of second grade students take the Seminole County Diagnostic Tool for communication and math basic skills. (See Appendix D for complete test) This instrument was the pre and post test, and increased growth, or lack of it, is noted between the CAI class and another grade 2 class not using CAI in Chapter V. Both classes were heterogeneously grouped with experienced teachers in both classes. Each child's test was scored noting the raw score and if the standard and skill which correlates to the Florida State Assessment Test was met or not met. (See Appendix E and F for tabulation sheets) A class compilation chart was made with pre and post scores and the gain, if any, of each standard per class was noted; this information is found in Chapter V.

The Grade 2 CAI class was given the Computer Awareness Test as a pre and post test and each question was analyzed to rate gain, if any. (See Appendix G for complete text)

All teachers were administered the Teacher Questionnaire for CAI. (See Appendix H for complete questionnaire) Each question was tabulated on a chart noting the teachers' responses to each question; this information is found in Chapter V.

The teacher implementing CAI was administered a lengthy questionnaire and all of her responses and comments is expressed in Chapter V. (See Appendix I for complete questionnaire)

This author assessed the CAI class 120 times during implementation and all results are tabulated on a chart in Chapter V. (See Appendix J for complete Assessment Tool.)

After the CAI workshop for parents an evaluation sheet was administered and all results are displayed in chart form in Chapter V. (See Appendix K for complete evaluation)

With the exception of the academic diagnostic tool for second grade, all instruments were developed by this author.

With results of these questionnaires and evaluations, this author had data to present in Chapter V that indicated from teachers, author, parents and students the success or lack of it of the CAI program that was implemented at English Estates Elementary School.

Chapter IV Solution Strategy

A. Possible Solutions

Developing a computer-literate school is a complex process and offers several possible solutions. Hunter (1983) describes a year-long experiment that produced mixed results in several schools that began CAI.

In some elementary and middle/junior high schools, computer-related skills and knowledge are as integral a part of learning and teaching as pencils, paper, discussion groups, and the three R's. In two suburban Washington school districts, for example, some kindergartners spent class time last year on testing and debugging the procedures that controlled their imaginary robot friend, ZEEP. Meanwhile, some primary students loaded and operated computer programs that helped them practice skills in mathematics, language arts, and logic. These youngsters also developed procedures that allowed them to use computers to alphabetize words, copy diagrams from grids, and frame precise directions for the reading of maps.

Second-graders watched and described the operation of computers in a local superemarket. Fourth-graders developed their own procedures for learning fractions by computers. Sixth-graders used computer programs to help analyze the results of their science experiments. They used word processors to experiment with and improve their compositions. They discussed issues related to the growing use of data banks and computer-generated mail.

Seventh-graders wrote programs to calculate the volumes of cones and prisms. Eighth-graders relived the discovery of America vicariously with the help of a computer-aided simulation, and they developed computer programs to help their classmates learn history facts and grammar.

These are just a few of the hundreds of computer-related activities that went on in six schools during the 1981-82 school year. The schools - located in Montgomery County, Maryland, and in Alexandria, Virginia - had volunteered to field-test a new guide for integrating computer use into the K-8 curriculum. The guide, titled My Students Use Computers (Hunter, 1983) was developed by the Human Resources Research Organization in Alexandria, in conjunction with the Montgomery County schools. It covers computer use in four curricular areas: mathematics, science, social studies, and language arts.

The pilot project provided (with certain exceptions) no support to participating schools other than draft copies of the guide for teachers who requested them.

The only obligation on the part of the teachers was to report any lesson plans they made or activities they conducted that involved computers. Project staff members observed classroom activities and interviewed teachers, principals, students, and library media specialists about ways in which the Guide should be improved.

Thus, one way to implement CAI is to present hardware and software to teachers and let CAI gradually be infused into teaching strageties.

Another solution is one that the Office of Computer-Related Instruction (OCRI) of Washington, D.C. utilized. The OCRI provided semester-long inservice training courses in computer literacy for teachers; it also provided numerous half-day sessions in local schools for school board members and for administrators and teachers. The OCRI also helped school staffs review and acquire software, advised on equipment acquisitions, assisted with computer-related curriculum development, and performed many countywide planning and budgeteing functions related to instructional computing.

CAI was generated by district level administrators and local schools followed their instructions.

Another possible solution is to ignore computer assisted instruction until it becomes such a household skill that children will develop CAI at home and transfer their knowledge to classroom instruction.

Considering the philosophical, pedagogical and financial problems ahead, the supposed computer revolution in schools seems barely under way. "What you have now," says Alan Kay, chief scientist at Atari, "is a bunch of people attempting to teach violin who have had a six-week course in what the violin is and who have never heard violin music before."

Thus, a school administrator could table CAI until teachers and students "hear the music from the home."

Many schools have a computer in the Media Center and it has become the responsibility of the Media Specialist to infuse computer awareness into the curriculum along with the skill of knowing how to use the card catalogue, reference skills, etc. The county that this author serves has a computer staff development program that would allow one to three teachers per school to receive thirty hours of CAI training. At this rate of sending three teachers per year for training, it would take seven years to train all teachers.

B. This author believes that one can think of computer assisted instruction as a further step in the automation of education. (Certainly books and the printing press represent earlier steps.) Undoubtedly it will disrupt the current, traditional system, and eventually it could displace some teachers. It seems likely that this will occur rather slowly - indeed, almost all changes in education occur rather slowly. Also, it should be recognized that teachers play many roles in education. While CAI can help fill some of these roles, it makes little or no contribution to others. Children need loving, caring, feeling teachers. Computers can give teachers more time to use these human capabilities.

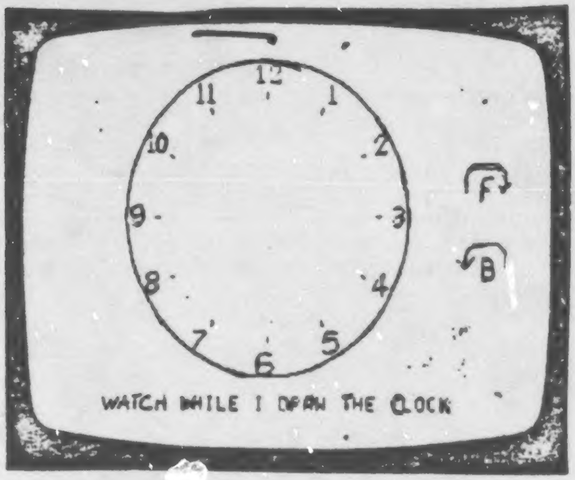
The solution of developing a CAI program that this author selected was:

1. Coordinating schoolwide staff development during the year on CAI.
2. Involving parents in workshops that will assist them in becoming computer literate as well as present the infusion of technology with elementary curriculum.
3. Established a prototype classroom (Grade 2) that used CAI.
4. Established a network of educators that were interested in CAI to share their software evaluation and successes and failures of implementing a CAI program.

This author was responsible for staff development at school, leadership in curriculum development, parenting courses and budget. He set aside teacher workdays for CAI awareness (needs assessment results from staff); worked closely with a grade 2 teacher who volunteered to establish a prototype classroom under his direction; and offered CAI awareness to parents.

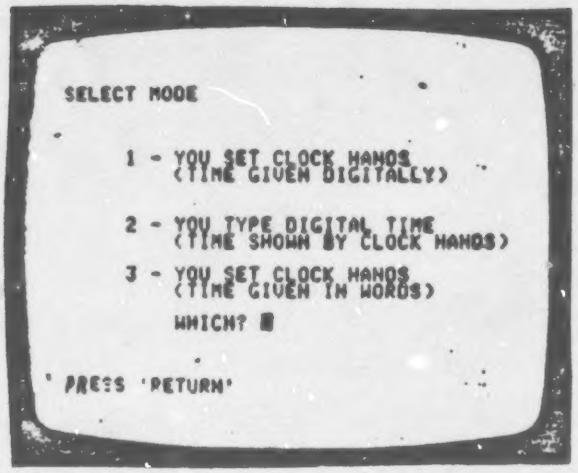
A typical CAI program that was utilized is the CLOCK and CALENDAR SKILLS software developed by the Hartley Courseware, Inc. for the Apple II.

CLOCK is an innovative program that allows a student to practice telling time in three different ways. At the beginning of the lesson, the program captures the student's attention with, "WATCH WHILE I DRAW THE CLOCK," and the clock begins to appear (Fig. 1). The student types his name, and a series of activity options are displayed (Fig. 2).



```
WATCH WHILE I DRAW THE CLOCK
```

FIGURE 1.



```
SELECT MODE

     1 - YOU SET CLOCK HANDS
         (TIME GIVEN DIGITALLY)

     2 - YOU TYPE DIGITAL TIME
         (TIME SHOWN BY CLOCK HANDS)

     3 - YOU SET CLOCK HANDS
         (TIME GIVEN IN WORDS)

         WHICH? █

' PRESS 'RETURN'
```

FIGURE 2.

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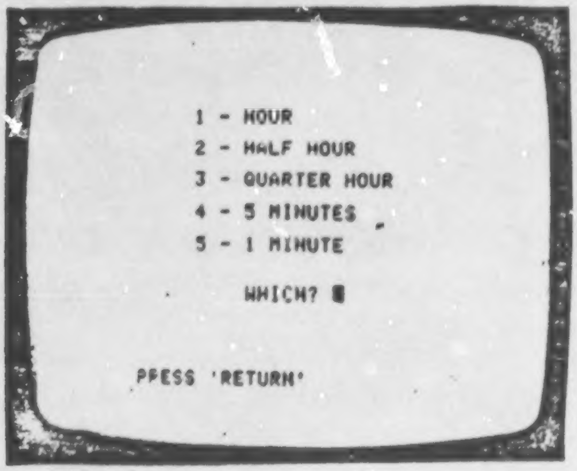
After the student types the number of the activity mode of his choice, further refinements for the selected activity appear for modes 1 and 2 (Fig. 3).



```
1 - HOUR
2 - HALF HOUR
3 - QUARTER HOUR
4 - 5 MINUTES
5 - 1 MINUTE

    WHICH? █


PRESS 'RETURN'
```

FIGURE 3.

Objectives for the CLOCK program are clear, and are listed on the last page of the Teacher's Guide under Instructional Skills. The page begins:

> Given a diagram of a clock with hands showing "clock time," the student will write the corresponding digital time to the nearest:
>
> a. hour
>
> b. half-hour
>
> c. quarter-hour
>
> d. 1 minute

The program is appropriate for use in first through fifth grades. Any teacher will immediately know if his/her students need practice on these skills; this sees the target level as second or third grade in a regular classroom and appropriate for older students in a special-education setting.

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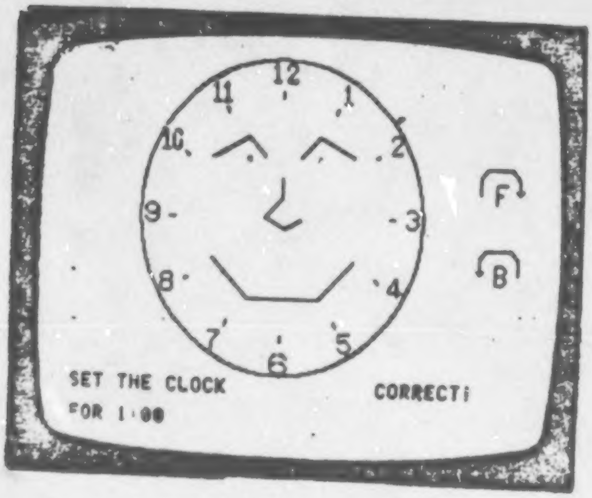
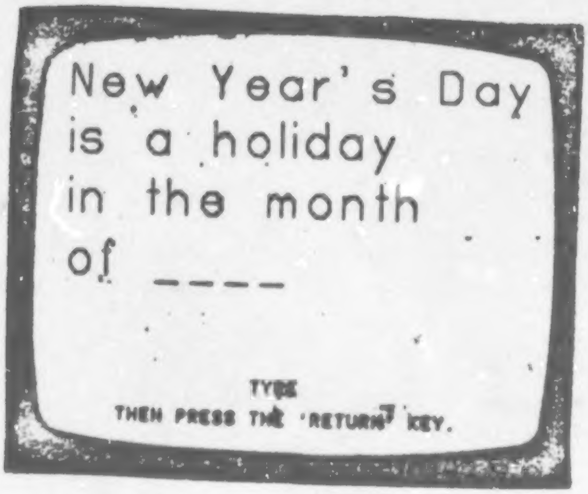
The concepts presented by Hartley's CALENDAR pro- program, order of days and months, abbreviations, seasons, and major holidays, are important ones for students to learn. Figures 4, 5 and 6 are examples of this CAI program.



SET THE CLOCK
FOR 1:00

CORRECT!

FIGURE 4.



New Year's Day
is a holiday
in the month
of ____

TYPE
THEN PRESS THE 'RETURN' KEY.

FIGURE 5.

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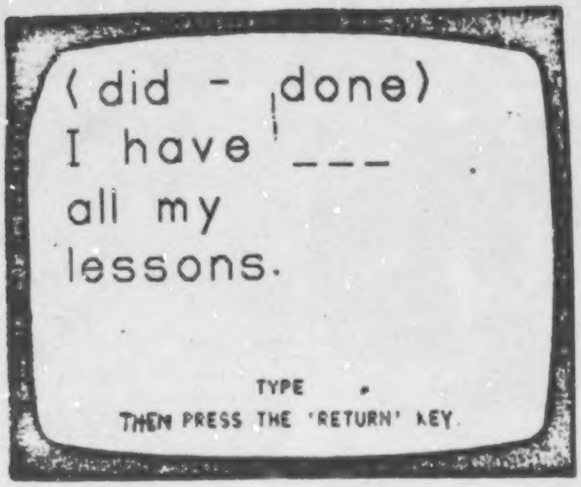

(did - done)
I have ___ .
all my
lessons.

TYPE .
THEN PRESS THE 'RETURN' KEY.

FIGURE 6.

Utilizing the above software and similar CAI programs, this author planned to develop and implement a program design in CAI.

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The solution selected had students beginning at the second grade level learn to check out a program disk or tape from the program library, turn on the computer system, load a program, run a program, and return the tape or disk to the program librarian.

Each week every student had at least 15-20 minutes of use of drill and practice materials on a computer. The materials were in a variety of subject matter areas and suited to the level of the student. Thus, students experienced computerized drill in arithmetic, geography, history, spelling, vocabulary, and so on.

Each week every student had at least 15-20 minutes of use of an interactive simulation/game designed to help students learn some subject matter. These were chosen to reflect a variety of curriculum infusion.

Each week every student had at least 15-20 minutes of use of a microcomputer for recreational purposes. The student had the choice of a variety of games suited to his/her hand-eye coordination, mental skills, and interests. The overeall result of this program of computer usage was that each student learned to use a computer and (probably) enjoyed the overall process.

In addition to computer awareness for parents, this author utilized the computer to send home to parents letters regarding their child's academic needs. Included at this time is a sample parent letter used by the Houston Independent School District.

RODERICK
GRADE 3

BERRY ELEM
TEACHER - LAGO

DEAR PARENT,

YOUR SUPPORT AND INVOLVEMENT IN OPERATION FAIL-SAFE IS MAKING A BIG DIFFERENCE IN HELPING RODERICK'S READING SKILLS. ATTACHED ARE SOME MORE ACTIVITIES THAT YOU CAN USE AT HOME.

GOOD LUCK IN HELPING YOUR CHILD BECOME A BETTER READER.

READING PRESCRIPTION FOR RODERICK

* MATERIALS; NEWSPAPER, COLORED PENCIL.

ASK YOUR CHILD TO HUNT HEADLINES FOR BLEND WORDS. ASK HIM TO CIRCLE THE ONES HE FINDS. HELP HIM READ WORDS HE DOESN'T KNOW. LET HIM READ THE WORDS HE DOES KNOW.

* PAIR PICK

CAN YOUR CHILD HEAR THE TWO WORDS THAT BEGIN ALIKE? READ THE THREE WORDS TO HIM. TWO OF THEM BEGIN WITH THE SAME SOUND. SEE IF YOUR CHILD CAN PICK THE PAIR THAT BEGINS ALIKE.

EXAMPLE;

SKIP SKILL STAND — WHICH TWO BEGIN THE SAME? (SKIP, SKILL) WHAT TWO LETTERS MAKE THAT SOUND? (SK)

DO THE SAME FOR THESE WORDS;

1. SMUG SPILL SMELL
2. STOP SNOW STAIRS
3. SPUN SWIM SPOT
4. SWING SWEATER SKIRT
5. SNUG STONE SNACK
6. SMART SMELL SNOW
7. SPEAK SPUNK SMILE

* GOOFY SENTENCES

ASK YOUR CHILD TO MAKE SOME "GOOFY SENTENCES" WITH THE BLENDS. THE OBJECT IS TO INCLUDE AS MANY BLEND WORDS AS YOU CAN. THE SENTENCES CAN BE SILLY FOR MORE FUN.

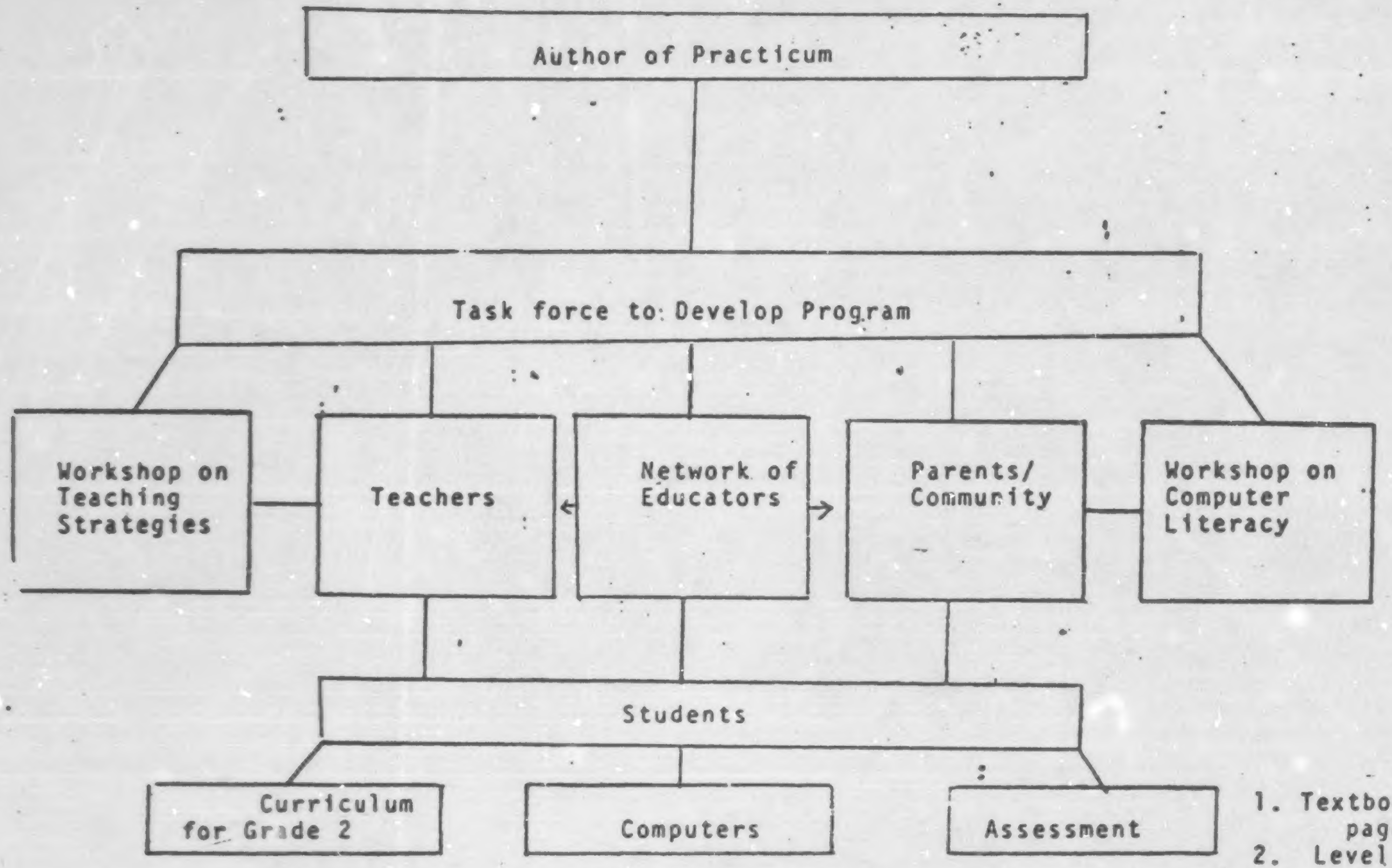
EXAMPLES;

SMALL SNAKES SKATE SPEEDILY.

FLIMSY BLUE FROGS DRIVE SMALL PLAY CARS.

TO GET THINGS STARTED, SUGGEST BUILDING A LIST OF BLEND WORDS FOR "ST," "SK," "SM," "SF," "SW," "SN," "CL," "FL," "PL," "SL," "BR," "CR," "DR," "FR," "GR," "PR," "TR," AND "BL." BRAINSTORM WITH YOUR CHILD TO THINK OF AS MANY WORDS AS YOU CAN FOR EACH BLEND. THEN WORK TOGETHER ON CREATING THE GOOFY SENTENCES.

Since CAI is a complex process and can not be accomplished alone, this author established a network of educators to share experience in computer assisted education. This quality circle of educators were from two Florida school systems: Seminole and Orange Counties. Newsletters generated by this author periodically were sent to the network of educators.


Author of Practicum
Task force to Develop Program
Workshop on Teaching Strategies
Teachers
Network of Educators
Parents/ Community
Workshop on Computer Literacy
Students
Curriculum for Grade 2
Computers
Assessment

1. Textbook/workbook pages
2. Level tests
3. Computer management
4. Author's pre-post test

FLOWCHART

CALENDAR

May, 1983 - PPG written
- contacted Seminole County's Computer Coordinator
- students began computer literacy

June, 1983 - PPG approved
- reviewer assigned: Dr. G. H. Lowen
- review of literature begun

July, 1983 - task force established:
Computer Assisted Education
- staff development planned
- ordering of additional Apple II computers

August, 1983 - draft written, sent

November, 1983 - proposal written, sent to reviewer; revised; this revision approved
- staff development begun
- students programmed on individual curriculum development
- newsletter sent to educators in Seminole and Orange Counties to establish Network of Educators for Computer Assisted Education.
- parent/community workshop in "Computers in Education"

December, 1983 - networking newsletter

January, 1984 - networking newsletter

February, 1984 - networking newsletter

April-May, 1984 - evaluation of network questionnaire sent to networking group

- post tests administered to students
- data collected and analyzed

June, 1984 - Chapter V written

- Practicum II sent to Nova University

CHAPTER V.

A. Presentation and Analysis of Results

As previously stated in Chapter III, Section A, this practicum was designed to "improve and increase academic mastery with computer literacy." For this goal to be achieved it required that teachers become knowledgeable of teaching strategies that utilize computer instruction. In a questionnaire the teachers were asked seven questions related to CAI. Table 1 gives the results of the data compilition of all teachers K-5 at English Estates. This was the first year of addressing computer literacy at English Estates Elementary via inservice. The administrator utilized the Seminole County Computer Instruction Office to assist in schoolbased staff development.

TABLE 1

Teachers (K-5) Qestionnaire for CAI

N=26

1. Is the County Computer Inservice preparing you to implement a CAI program?

9 yes 17 no

2. Do you think computers should be used in elementary schools?

24 yes 2 no

3. Indicate the grades CAI should be used.

Choice		Grade	#of respondents placing grade in that choice
1st choice	-----	Gr. 5	14
2nd choice	-----	Gr. 4	16
3rd choice	-----	Gr. 3	16
4th choice	-----	Gr. 2	14
5th choice	-----	Gr. 1	13
6th choice	-----	Gr. K	12

4. When should the computer be used:

Choice		Strategy	# of respondents
1st choice	-----	remedial	10
2nd choice	-----	simulation	9
3rd choice	-----	tutorial	5

5. In what subject areas should the computer be utilized:

Choice		Subject	# of respondents
1st choice	-----	Reading	16
2nd choice	-----	Math	14
3rd choice	-----	Science	12
4th choice	-----	Social Studies	9

6. Do you have anxiety about using the computer as a teaching tool?

8 yes 18 no

7. Are you more knowledgeable of CAI after this Staff Development Activity?

24 yes 2 no

Upon completion of the countywide CAI inservice, investigation of the teachers response to, "Is the County Computer Inservice preparing you to implement a CAI program?" Seventeen teachers said "no," while nine said it was preparing them for CAI implementation. As administrator of this school, this response was a concern because it revealed that more time for complete CAI preparation is required. The offering by the County of its CAI inservice (5 hours) does not met the needs of the teachers; thus, plans are being made for an intensive 20 hour CAI inservice over the 1984-85 school year that must be infused into the staff development school-based program. This author would like to note at this time that the Grade 2 teacher selected to implement the CAI program in her class had 20 hours of inservice and assessed this as adequate preparation to implement CAI.

The staff assessed the implementation of CAI to begin with grade 5 and follow through to grades 4, 3, 2, 1 and kindergarten. This author will utilize this result in implementing a CAI schoolwide program by concentrating inservice hours on Grade 5 teachers first. Staff Development funds will be used to send the three Grade 5 teachers to computer "hands on" activities for full day inservice, computer conferences as well as offer to the staff 20 hours of after school inservice during the next school year. The staff is dedicated to improving teaching skills, and will accept after school inservice that will lead to teacher recertification. This inservice will be coordinated by this author and the consultants will be from the County's Computer Instruction Division as well as outside consultants.

As general as this staff development was, the teachers still assessed this inservice as successful since it did make them more knowledgeable of teaching strategies that utilize computer instruction. In question #7, 24 trachers stated that this inservice made them more knowledgeable of CAI while 2 teachers did not assess this activity as making them more skilled. This author has assessed that staff development for CAI is most important and is the foundation of a computer assisted curriculum program; however, the inservice cannot properly be accomplished without time and money. Giving teachers facts and figures about the success a CAI program has on children is fine, but teachers must become comfortable and skilled with the computer. This requires indepth staff development which concentrated on hands-on activities. This will be a top priority of this administration 1984-85 staff development program. The following statement is a brief summary of how the 1983-84 school-based computer inservice was developed.

During the first inservice day in the fall, each teacher was instructed in basic care and operation of computers. Time was also given to previewing programs that would meet students' needs. During the December inservice each teacher evaluated programs in the areas of science, math, language arts, and social studies. They also searched catalogs for additional programs from which they could recommend specific programs for future purchase. Additional inservices dealing with teacher utility programs, correlating computer programs with the existing curriculum, and computer management were presented.

This author would like to present at this tim his assessment on presenting computer workshops:

1. Address Specific, Demonstrated Needs

   The first, and perhaps most critical stage in workshop preparation is deciding what topics and skills to address. Workshop designers in this area quickly recognize that "computer literacy" encompasses a variety of skills, only a few of which can be handled comprehensively in any one workshop. To decide which skills are to be the focus of the workshop, the designer should consider two factors concerning the intended audience:

   a. The background, previous experience, and expectations of participants: What they already know and what they want to learn, and
   b. Special requirements of their environment: What they need to learn because of district- or state-mandated computer skills.

   As with all effective instruction, the learners must be the primary consideration during the planning and design. The workshop can meet both their needs and their expectations, taking them from where they are in terms of skills to where they need and want to be. Avoid frustrating them by starting at too high a level and boring them by starting too low.

   If the audience is already identified and the designer is unsure what the teachers already know and what they want to learn, the best step is to develop a brief survey. It should be administered quickly to a reasonable-size sample of the group by telephone or in person, if feasible, and be made up of "check-off" questions, rather than questions requiring open-ended responses.

Some skills will come to be included by necessity to meet some mandated requirement. For example, computer skills will soon be added to Florida's statewide Teachers Competency Examination, and all teachers in the state will have to show mastery of these skills to be certified or re-certified.

If the audience is not identified, and the workshop has to "sell itself" to attract participants, the designers have to decide what topics and skills have the highest probability of being useful to teachers in the area from which they will draw. The following topics are for consideration in most areas:

- BASIC COMPUTER LITERACY.
  Operation of a computer (use of keyboard, loading and running programs); hardware and software components of a computer system; how software (programs) communicates with hardware; selecting a microcomputer for your needs; overview of applications in education.

- ADVANCED COMPUTER LITERACY (PROGRAMMING).
  How programs are developed; capabilities and uses of various languages; using commands in a given language (usually BASIC) to write programs; debugging techniques.

- INTEGRATING COMPUTERS INTO CLASSROOM INSTRUCTION.

  Kinds of available courseware and support software; how to select areas of curriculum in which to use computers; preparation of students and classroom for computer use; selecting quality courseware and software; planning at the district and school level.

- ADMINISTRATIVE APPLICATIONS

  Using spreadsheet and data base management software to accomplish budget preparation and planning, grade reporting, inventory control, and other school administrative activities.

- TEACHING COMPOSITION USING WORD PROCESSING

  How word processing can enhance language and composition instruction; operation of a given word processor; methods of instructing students in composition preparation and revision; identifying writing assignments appropriate for use with the word processor.

2. Communicate the Level of Workshop Skills

   Many workshops are unsuccessful not because they address skills ineffectively, but because they address skills other than those the participants expected. Workshop designers often realize too late that titles alone do not communicate the same thing to everyone; cries and mutters of "We thought you were going to cover..." fill the air. To prevent this frustrating situation, advertise the prerequisites and the skills to be covered in the workshop in a specific terms as space permits. Even if the audience is a captive one - for example, a district inservice session - write out this information and distribute it to all participants.

3. Make It a Working Workshop

Although the new Random House College Dictionary defines "workshop" as a "seminar or discussion group which emphasizes the sharing of ideas," every teacher in attendance will appreciate the experience more if they are required to kparticipate in some way other than discussion. Demonstrate activities and then provide participants with structured, "hands-on" practice in the activities. If the topic is "computer literacy," then the workshop is really not complete without some time on the computer for each particicipant.

The best kind of workshop is one that teaches even after everyone goes home. Always assume that the workshop will be an unparalleled success, and that participants will want to remember what was covered and continue learning about computers. To this end, provide as many of the following as possible:

- Hand-outs and/or a workbook of the materials and main points covered in the workshop.
- Lists of resource materials such as magazines, bibliographies, and catalogs.

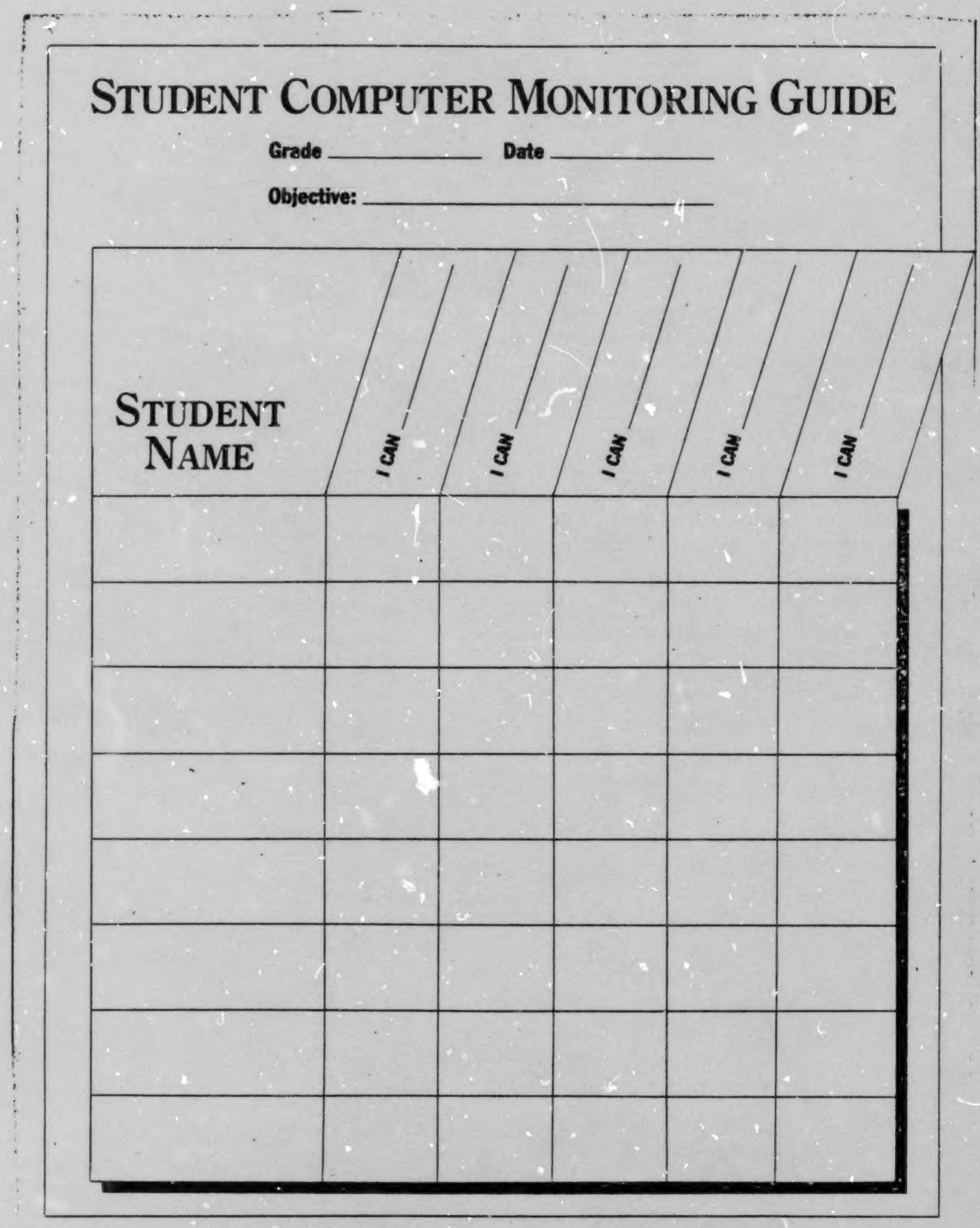
Presenting a good computer workshop is not the easiest

> undertaking in the world, but the potential rewards to both presenter and participants are well worth the time and preparation.

This author utilized suggestions from Dr. M. D. Roblyer who assisted in preparing Florida educators to become leaders in CAI and in presessions that made educational administrators ready to accept the various presentations offered at the Florida Instructional Computing Conference in Orlando, Florida on February 7, 1984.

The second terminal objective for teachers was "... to utilize computer assisted instruction for curriculum development." The computer management design was the activity for student remediation utilizing commercial software. The following chart is a student monitoring guide developed for each child that would address particular needs for each Grade 2 CAI student. This class chart lists the student's name and what he/she can do in regard to academic mastery. The academic mastery was assessed by meeting criteria on CAI basic skills software. Each student completed a predetermined number of programs (example subtraction 2 digit - 1 digit, 10 problems) and the computer scored and evaluated the child's success or lack of success on each skill. When the student successfully completed a skill, his/her name was written on the chart saying he/she "can do....." A merit badge was given to the student with the skill displayed in the star. The following figures are an example of the chart and merit badge.

FIGURE 7



STUDENT COMPUTER MONITORING GUIDE

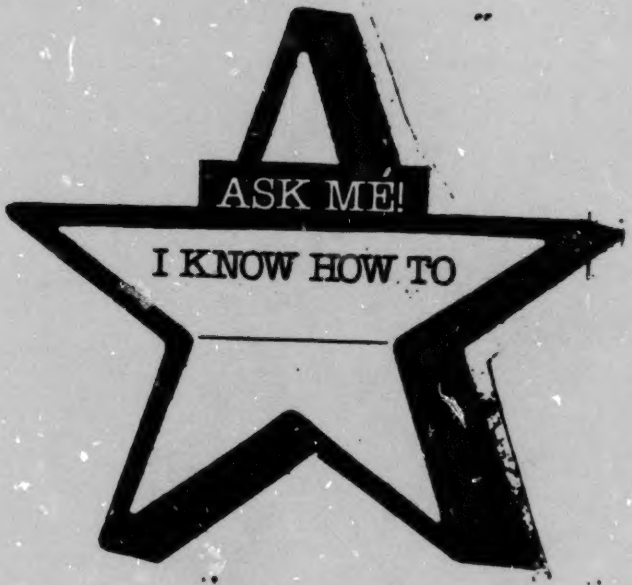
Grade ____________ **Date** ____________

Objective: ______________________________

STUDENT NAME	I CAN ____	I CAN ____	I CAN ____	I CAN ____	I CAN ____

FIGURE 8

Student Merit Badge to be given to Grade 2 student after successfully completing a basic skill.


ASK ME!
I KNOW HOW TO

The software assessed by this author as excellent in CAI activities are:

LANGUAGE ARTS

EDUCATIONAL STORY SERIES; Two reading and comprehension skill-building programs, Tom Thumb and Masters of the Balaxy. Decision-making, interaction, and multiple vocabulary levels are featured. (Apple II+ and IIe, 48K Thumb and 64K Masters, $29.95 each. International Software Systems, PO Box 5427, Richmond, VA 23220; 804/359-2211)

CHATTERBEE; AN INTERACTIVE spelling program with synthesized speech. Two word levels per grade, grades 1-12. When a word is spelled correctly, the player received smiles from a colorful bee. (Atari micros 40K, Commodore 64, $39.95. Tronix Publishing Inc., 8295 S. La Cienega, Inglewood, CA 90301; 213/215-0529)

SPELLAGRAPH: A mystery message is revealed by spelling words correctly. Both games for ages 7-14 (Apple micros and Atari micros 48K, and IBM PC and PCJr 64K, $39.95 each. Designware, 185 Berry St., San Francisco, CA 91407. 415/546-1866)

SPELLAKAZAM; Spelling accuracy and hand-eye coordination are both required to outwit a spelling magician.

CONTAINED READING SERIES: Improves comprehension and vocabulary while fostering fluent silent reading on reading levels 2-10. (Apple II micros 48K, Franklin Ace 1000 and 1200 48K, $189 per level. A/V Concepts Corp., 30 Montauk Blvd., Oakdale, NY 11769; 516/567-7227)

CLOZE-PLUS by I/CT is a computer-based reading improvement for Apple II+ that develops comprehension skills and a vocabulary through structured cloze and context analysis strategies. The program includes 120 reading selections on reading levels 3-8. Each level consists of 20 lessons on four diskettes. Each lesson consists of 7- to 12-paragraph expository reading selection on a particular topic. Lesson content includes topics in the areas of national science, sports, inventions, historic events, archaeology, myths, legends, etc. Reading selections are written with vocabulary controlled by reading level, and the strategies developed include a wide variety of semantic and syntactic clues.
Individual sets with Teacher's Guide (1 level) are available at $150. Combined sets with Teacher's Guide (3 levels are available at $425. Backup sets must be requested with the original order and are available at $75. Contact: Instructional Communications Technology, Inc., 10 Stepar Place, Huntington Station, NY 11746, (516) 549-3000.

For the 1984-85 school year the Houghton Mifflin Reading Program has a computer option that scores tests in minutes, produces reports and prescriptions instantly which releases the teachers for more "time on task" as well as affective interaction with students. Most reading programs considered for adoption have this component, but this author will report on the Houghton Mifflin Program since he is considering this for his school adoption. The following chart indicates the quick and easy knowledge that can be given to an administrator and teacher that will assist in curriculum development. This is but one example of the computer use for curriculum management.

Table 2

Houghton Mifflin
One Beacon St.
Boston, MA 02108

The Reports

1. Student List

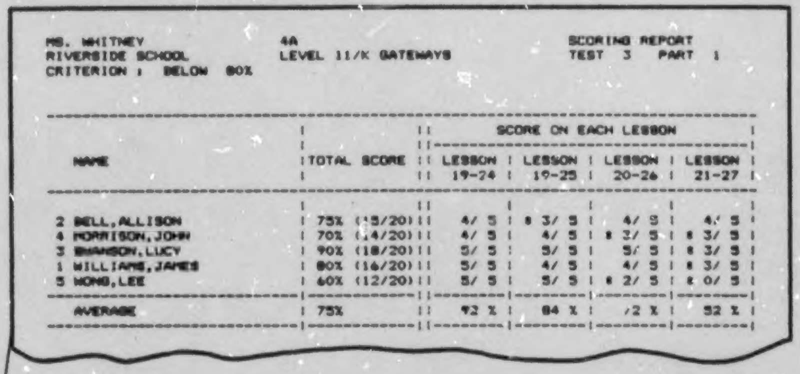
(not shown)
Lists students in each class alphabetically with their identification numbers. (Numbers are used for identification on their student response cards.)

2. Batch Summary

(not shown)
Indicates whether all student response cards have been scored correctly. If there are any problem cards, the corrected cards can be re-entered into the card reader and scored again.

3. Scoring Report

Lists all students tested with each student's score per objective and total score, as well as average scores for the whole class. Asterisks signal those students who fall below the mastery level you select so you can instantly identify who needs help.



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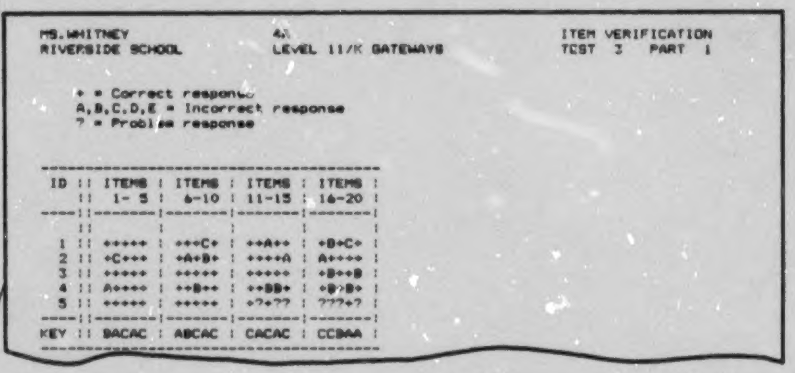
MS. WHITNEY                 4A                                  SCORING REPORT
RIVERSIDE SCHOOL            LEVEL 11/K GATEWAYS                 TEST  3   PART  1
CRITERION :  BELOW  80%

--------------------------------------------------------------------------------
                           |              ||         SCORE ON EACH LESSON        |
                           |              ||-------------------------------------|
   NAME                    |TOTAL SCORE   || LESSON  | LESSON  | LESSON | LESSON |
                           |              ||  19-24  |  19-25  |  20-26 |  21-27 |
--------------------------------------------------------------------------------
                           |              ||         |         |        |        |
 2 BELL,ALLISON            | 75% (15/20)  ||   4/ 5  | * 3/ 5  |   4/ 5 |   4/ 5 |
 4 MORRISON,JOHN           | 70% (14/20)  ||   4/ 5  |   4/ 5  | * 3/ 5 | * 3/ 5 |
 3 SWANSON,LUCY            | 90% (18/20)  ||   5/ 5  |   5/ 5  |   5/ 5 | * 3/ 5 |
 1 WILLIAMS,JAMES          | 80% (16/20)  ||   5/ 5  |   4/ 5  |   4/ 5 | * 3/ 5 |
 5 WONG,LEE                | 60% (12/20)  ||   5/ 5  |   5/ 5  | * 2/ 5 | * 0/ 5 |
---------------------------|--------------||---------|---------|--------|--------|
   AVERAGE                 | 75%          ||   92 %  |   84 %  |   72 % |   52 % |
---------------------------|--------------||---------|---------|--------|--------|
```

4. Item Verification

Lists students' responses for each test item so you can quickly identify incorrect responses.



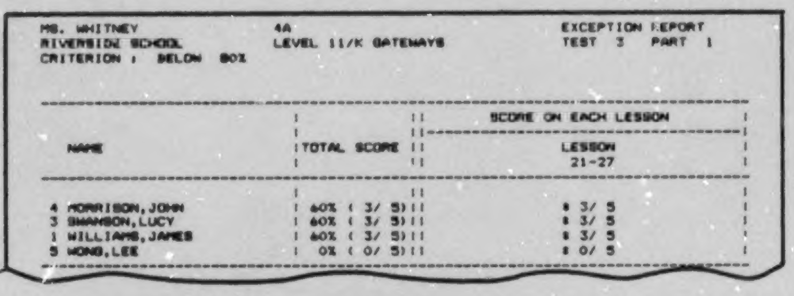
```
MS.WHITNEY                  4A                                  ITEM VERIFICATION
RIVERSIDE SCHOOL            LEVEL 11/K GATEWAYS                 TEST  3   PART  1

    + = Correct response
    A,B,C,D,E = Incorrect response
    ? = Problem response

---------------------------------------------
 ID || ITEMS | ITEMS  | ITEMS  | ITEMS  |
    ||  1- 5 |  6-10  | 11-15  | 16-20  |
----||-------|--------|--------|--------|
    ||       |        |        |        |
  1 || +++++ | +++C+  | ++A++  | +B+C+  |
  2 || +C+++ | +A+B+  | ++++A  | A++++  |
  3 || +++++ | +++++  | +++++  | +B++B  |
  4 || A++++ | ++B++  | ++BB+  | +B?B+  |
  5 || +++++ | +++++  | +?+??  | ???+?  |
----||-------|--------|--------|--------|
KEY || BACAC | ABCAC  | CACAC  | CCBAA  |
---------------------------------------------
```

5. Exception Report

Lists all students whose scores are below mastery level on a specific objective.

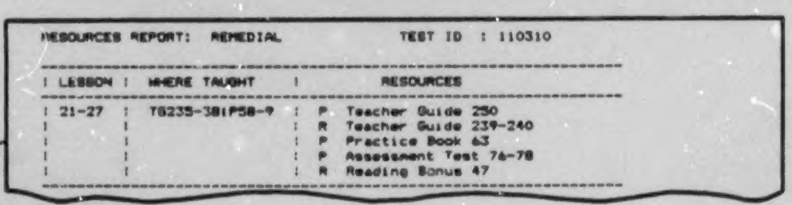


```
MS. WHITNEY                 4A                                  EXCEPTION REPORT
RIVERSIDE SCHOOL            LEVEL 11/K GATEWAYS                 TEST  3   PART  1
CRITERION :  BELOW  80%

--------------------------------------------------------------------------------
                           |              ||         SCORE ON EACH LESSON        |
                           |              ||-------------------------------------|
   NAME                    |TOTAL SCORE   ||              LESSON                 |
                           |              ||               21-27                 |
--------------------------------------------------------------------------------
                           |              ||                                     |
 4 MORRISON,JOHN           | 60% ( 3/ 5)  ||              * 3/ 5                 |
 3 SWANSON,LUCY            | 60% ( 3/ 5)  ||              * 3/ 5                 |
 1 WILLIAMS,JAMES          | 60% ( 3/ 5)  ||              * 3/ 5                 |
 5 WONG,LEE                |  0% ( 0/ 5)  ||              * 0/ 5                 |
--------------------------------------------------------------------------------
```

6. Resources Report

Lists Houghton Mifflin materials for any specific objective for either practice, remedial, or enrichment work, or all three.

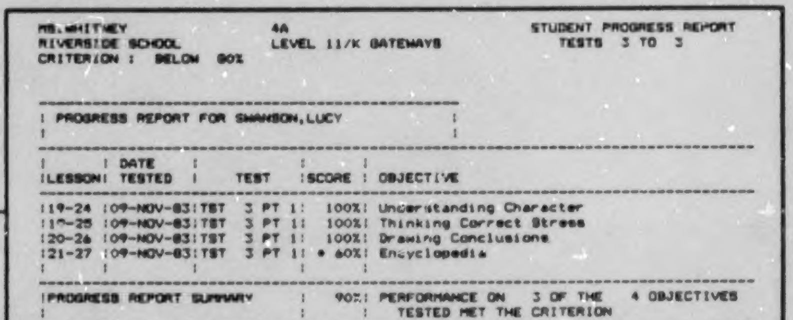


```
RESOURCES REPORT:  REMEDIAL             TEST ID  : 110310

-------------------------------------------------------------
| LESSON |  WHERE TAUGHT    |           RESOURCES
-------------------------------------------------------------
| 21-27  |  TG235-38|P58-9  |  P  Teacher Guide 250
|        |                  |  R  Teacher Guide 239-240
|        |                  |  P  Practice Book 63
|        |                  |  P  Assessment Test 76-78
|        |                  |  R  Reading Bonus 47
-------------------------------------------------------------
```

7. Student Progress Report

Lists a specific student's test data on one or more tests. Objectives are clearly stated for use in parent conferences.



```
MS.WHITNEY                  4A                           STUDENT PROGRESS REPORT
RIVERSIDE SCHOOL            LEVEL 11/K GATEWAYS               TESTS  3 TO  3
CRITERION :  BELOW  80%

----------------------------------------------------
| PROGRESS REPORT FOR SWANSON,LUCY                 |
|                                                  |
--------------------------------------------------------------------------------
|      | DATE      |            |       |
|LESSON| TESTED    |    TEST    |SCORE  | OBJECTIVE
--------------------------------------------------------------------------------
|19-24 |09-NOV-83|TST   3 PT 1|   100%| Understanding Character
|19-25 |09-NOV-83|TST   3 PT 1|   100%| Thinking Correct Stress
|20-26 |09-NOV-83|TST   3 PT 1|   100%| Drawing Conclusions
|21-27 |09-NOV-83|TST   3 PT 1| *  60%| Encyclopedia
|      |         |            |       |
--------------------------------------------------------------------------------
|PROGRESS REPORT SUMMARY       |    90%| PERFORMANCE ON   3 OF THE    4 OBJECTIVES
|                              |       |   TESTED MET THE CRITERION
--------------------------------------------------------------------------------
```

BEST COPY AVAILABLE

In the area of math, the following courseware proved successful:

MATH GAMES

Produced, by: Ed-U-Comp, P.O. Box 173, Freeport, NY 11520

Target, Group: Grades 1-6, math. Materials: Diskette, folder with description of contents. Price $39.95

and the Addison-Wesley Basic Skills software that correlated to the math series used at this author's school.

This author would like to make mention of COMPUTER DIRECTIONS FOR SCHOOLS which publishes manuals to assist staffs in the planning, organization and implementation of various computer-related activities at their schools. The manuals were written primarily with the elementary school in mind; however, many of the ideas can be easily adapted at the junior high level. The material is presented in an easy-to-read format, with helpful attachments to facilitate effective school computer management.

Closure on computer software would not be complete without mention of the current National Education Association's (NEA) conflict of interest over computer software for school.

The National Education Association (NEA) announced the formation of its Educational Computer Service (ECS) last summer, and educators and publishers applauded the creation of a national organization devoted to evaluating and disseminating educational software. Since the February publication of its first catalog of approved programs, however, much of that praise has turned to criticism - to the point that the U.S. House of Representatives recently tacked onto a multimillion dollar appropriations bill a measure designed to prevent schools from spending any monies received from that bill on software bought through the NEA service.

The charge is conflict of interest, stemming from the fact that the ECS, together with Cordatum, Inc., the Bethesda, MD software consulting firm that funded and administers the project, markets the programs that it approves. Only programs submitted by their publishers are considered; publishers must pay a fee (between $100 and $1000 per program) for the evaluation. Programs are then sent out to selected Washington-area educators, who evaluate the programs according to a series of guidelines developed by the ECS (available to the public in booklet form). Those programs deemed acceptable (about one in ten, according to the NEA) are awarded a triangular "NEA" Teacher Certified" seal for use in packaging and advertising, and are included in the service's "Yellow Book" catalog, through which educators can place their orders. Revenues from the orders are divided evenly between Cordatum and the NEA National Foundation for the Improvement of Education, which runs the service.

It's the money-making aspect of the project, some publishers contend, that casts the intentions of the service in a questionable light. Thomas Barsh, president of American Educational Computer (Palo Alto, CA) says his company has "no intention" of submitting programs to the NEA. "How can they be independent in their judgement... if they're in the business of making money off evaluating and distributing software?" he asks. Such was the sentiment of the supporters of the

Congressional amendment as well; said Illinois Representative John Erienborn, "If an organization withholds their endorsement from one product and gives it to another, and they profit by that decision, then that should not be allowed, and it certainly should not be allowed with the use of Federal funds." The amended bill, The Vocational and Technical Education Act of 1983, is not in Senate hearings. With new teaching technology comes political problems and concerns.

The terminal objectives for students were to increase computer literacy and to increase academic mastery. Through an evaluation instrument for computer literacy developed by this author, two second grade classes were assessed, one class with a computer in the classroom and the other class using the school computer in the media center. The following tables (3-6) reports the data of the pre and post tests. (See Appendix G for complete assessment instrument)

This author would like to note at this time that in both Grade 2 clasues there were 20 students who were present throughout the school year. Students who transferred in and out of both classrooms were not included in the pre and posttest results.

TABLE 3

Compilation of CAI Class with Non-CAI on Pre and Post Computer Awareness Test

Question No.	CAI class % Correct			Non-CAI Class % Correct		
	Pre	Post	Gain	Pre	Post	Gain
1.	35%	95%	+60%	0%	35%	+35%
2.	65%	90%	+25%	5%	85%	+80%
3.	60%	90%	+30%	45%	90%	+45%
4.	85%	100%	+15%	5%	90%	+85%
5.	80%	100%	+20%	0%	90%	+90%
6.	50%	100%	+50%	0%	100%	+100%
7.	30%	80%	+50%	25%	50%	+25%
8.	20%	70%	+50%	30%	55%	+25%
9.	15%	90%	+75%	0%	55%	+55%
10.	60%	80%	+20%	50%	80%	+30%
Average	50%	89.5%	+39.5%	16%	73%	+57%

TABLE 4

Pre Test Results of Computer Awareness

Grade 2

Question No.	CAI Class Correct	CAI Class Incorrect n = 20	CAI Class % Correct	Non-CAI Class Correct	Non-CAI Class Incorrect n = 20	Non-CAI Class % Correct
1.	7	13	35%	0	20	0%
2.	13	7	65%	1	19	5%
3.	12	8	60%	9	11	45%
4.	17	3	85%	1	19	5%
5.	16	4	80%	0	20	0%
6	10	10	50%	0	20	0%
7.	6	14	30%	5	15	25%
8.	4	16	20%	6	14	30%
9.	3	17	15%	0	20	0%
10.	12	8	60%	10	10	50%

TABLE 5

Posttest Results of Computer Awareness

Grade 2

	CAI Class			Non-CAI class		
Question No.	Correct	Incorrect n = 20	% Correct	Correct	Incorrect n = 20	% Correct
1.	19	1	95%	7	13	35%
2.	18	2	90%	17	3	85%
3.	19	1	90%	17	3	85%
4.	20	0	100%	18	2	90%
5.	20	0	100%	18	2	90%
6.	20	0	100%	10	10	50%
7.	16	4	80%	10	10	50%
8.	14	6	70%	11	9	55%
9.	19	1	90%	11	9	55%
10.	16	4	80%	16	4	80%

TABLE 6

Comparison of CAI Grade 2 Class with
Non CAI Class on Posttest Computer Awareness Test

Question No.	% Correct CAI Class	% Correct Non CAI Class	CAI class % Difference
1.	95%	35%	+60%
2.	90%	85%	+ 5%
3.	90%	90%	± 0%
4.	100%	90%	+10%
5.	100%	90%	+10%
6.	100%	100%	± 0%
7.	80%	50%	+30%
8.	70%	55%	+15%
9.	90%	55%	+35%
10.	85%	80%	+ 5%
Average	89.5%	73%	+16.5%

A positive evaluation would be one in which there was a 30% gain made by all students in the CAI classroom. When data was compiled, it resulted in a 39.5% gain from pretest to posttest for the CAI class. Thus the criterian was not only met but surpassed by 9.5%. When similar comparisons were made by the non-CAI class, it revealed that a 57% gain was made by students. The author would like to note that at the time of administrating the PRE Computer Awareness Test, the tuacher had the computer in her class for one month and had begun to use computer terminology (example, hardware, software, etc.). Thus, the students were more prepared to respond to computer awareness questions on the prettest. The non-Cai class had no preparation and thus scored 0% correct on 4 of the 10 questions which make their gain considerably higher. Investigation of the results reveal that:

> A CAI class is more aware of computer terminology and capabilities than a non-CAI class.

Grade 2 students of the CAI class not only mastered concepts of hardware, software, floppy diskettes, but only knew the models of computers: TRS80, LISA, Atari 1600, and Apple II; knew the capabilities of computers (storing information) and that LOGO is a computer program. All of the above skills were mastered with above 70% classwide mastery of the CAI class, while the non-CAI class had less than 70% mastery in computer concepts and awareness. All students knew what the curser was. Thus, a classroom computer creates a more computer aware child than having a computer in the Media Center where a student is exposed to computer time for 30 minutes per week, one computer to 20 students. The Hawthorne Effect, if any, on the CAI classroom is not measure-able.

This author completed 120 assessments of the CAI classroom (see Appendix J for Principal's Assessment of Students in Grade 2 Implementing a CAI Program). The following table is a compilation of the observation assessment.

TABLE 7

Compilation of Principal's Assessment of Students in Grade 2 Implementing a CAI Program

(daily checklist: total of 120 times)

	yes	no
1. A student was at the computer	106	14
2. Student was working independently	101	5
3. Student was working on math	58	
4. Student was working on language arts	48	
5. Student was distracted by my presence	93	13
6. Student was on task	104	2
7. Student was day dreaming	3	103
8. The class was distracted by a student at the computer	2	104
9. Computer audio distracted teacher		106
10. Computer audio distracted class		106

It is worthy to note that the computer audio was in no way a distraction to the teacher or to the class. This author preceived this as a possible distraction; however, was pleased that is was not. Of the 120 times assessing the CAI classroom, 58 of the times the students were involved in math activities. This was remediation at first, but as the year progressed math problem solving activities took the place of math facts. Forty-eight of the times assessed were spent in Language Arts activiities utilizing the various software mentioned in the beginning of Chapter V. The attention the students gave to their computer time was impressive; rarely was a student day dreaming or not on task. This in itself is impressive since the students looked forward to time on computer and did not waste any of their time.

The teacher of the CAI classroom was given a complete evaluation questionnaire to complete and the following report is her input on implementing a CAI curriculum.

TABLE 8

Teacher Evaluation for CAI

(Grade 2 Teacher Implementing CAI)

1. CAI has been used mainly for:

__2__ A. Remediation

__1__ B. Tutorial

__3__ C. Simulation

2. Put number 1 - 5 next to the subject areas indicating your most use CAI in that discipline. ex. 11 = CAI used the most; 2 = CAI used the next, etc.

__4__ Basic Reading Skills

__3__ Reading Comprehension

__1__ Math Basic Operations

__2__ Math Problem Solving

__NA__ Creative Writing

__1__ Language Arts Skills

__NA__ Social Studies

__5__ Science

3. Did you have anxiety about implementing a CAI program?

_____ yes __x__ no

4. If yes, has this anxiety diminished?

_____ yes __x__ no

If no, what would you include? Wide range of programs including basic writing and creative skills.

5. Did CAI motivate students to learn?

__x__ yes _____ no

6. A. Did CAI assist lower achievers?

___x___ yes ______ no

B. Did CAI assist average achievers?

___x___ yes ______ no

C. Did CAI assist high achievers?

___x___ yes ______ no

7. Where do you think the computer should be housed? (check one)

______ Media Center

______ Computer Lab

___x___ Classroom

8. Do you want increased staff development on How to Use the Computer?

___x___ yes ______ no

9. Did CAI assist high achievers?

___x___ yes ______ no

10. Indicate by 1, 2, 3, 4, and 5 the students who benefited by CAI utilizing #1 as most assisted, etc.

___1___ high academic achievers

___4___ average

___2___ low

___3___ discipline problem students

___5___ all students

11. Indicate by a check the percentage of students that could work independently on the computer.

___x___ 100 percent ______ 50 - 75

______ 90 - 99 ______ 25 - 50

______ 75 - 90 ______ 0 - 25

12. What subject area did you observe your students were most successful after CAI.

_____ Reading

__x__ Math

_____ Social Studies

_____ Science

13. Did student's independent work on the computer distract you from teaching others?

_____ yes   __x__ no

14. Was class distracted by the student on the computer?

_____ yes   __x__ no

15. Was computer audio a distraction to you?

_____ yes   __x__ no

16. Was computer audio a distraction to class?

_____ yes   __x__ no

17. Were parents pleased that a computer was in your classroom"

__x__ yes   _____ no

18. Did your planning time increase due to CAI?

_____ YES   __X__ no

If yes, by how much per week?

_____ minutes

19. Do you want the computer in your classroom next year?

__x__ yes   _____ no

Why? Great motivational and reinforcement tool.

20. How many students in your class have a home computer?

__5__

21. How many students had a home computer last year?

unknown

22. Please comment on the CAI program you implemented in your class, and give your opinion of the value, if any, of schoolwide CAI program.

The classroom CAI program provided a wide variety of interest and educational levels. As the children were able to set their own parameters, they came to a better understanding of self knowledge. The computers, as provided in the media center, were used primarily as a reinforcement and reward system. As such, I'm sure it was a benefit to those students who used them, however, real usage can only be provided when the number of students per computer is much lower.

A CAI program would not be complete without community/parent involvement. An evening workshop was planned for parents. Approximately 75 parents attended. Evaluations were sent out to all parents via the monthly newsletter. Thirty-six responses returned; this is almost a 50% response. This author suggests that evaluations be given immediately after the workshop so that more than 50% of the participants will respond. Table 9 is a display of the respondents evaluation.

TABLE 9

Parent Evaluation of Computer Workshops

n = 36

1. The Computer Workshop was:

27 excellent 9 satisfactory 0 poor

2. Would you want another Computer Workshop:

23 yes 2 no 11 no response

3. Do you think computers should be used in elementary schools?

36 yes 0 no

4. Do you want your child to know how to work on the computer:

36 yes 0 no

5. Would you want a computer in each classroom?

30 yes 3 no 3 no response

6. Which group of students should use the computer:

34 all students 1 average 1 no response

7. Do you have a home computer?

17 yes 16 no 3 no response

8. Did this workshop make you more aware of the use of computer in the elementary classroom:

33 yes 3 no

The Termial Performance was that 35% of respondents would assess this workshop as helping increase computer awareness and knowledge of CAI. 75 percent of the respondents assessed the workshop as excellent while 25% said it was satisfactory. Thus, the objective was not only met but surpassed.

Twenty-three respondents said they wanted another workshop while all parents stated that computers should be used in elementary schools by all students.

One of the goals of this practicum was to bring together educators outside English Estates Elementary School to share computer curriculum designs. The activity used was a networking circle brought together via newsletters sent to three schools in the Central Florida Public School District of Orange and Seminole Counties. Three educators at each school; the Principal, Media Specialist and a teacher, were sent the newsletters. The fourth and final newsletter contained a questionnaire (Appendix L) to be completed and returned to this author. The following Table displays the responses. (See Appendices M - P for complete newsletters)

TABLE 10

Evaluation of Networking Circle

n = 9

1. Did you become more knowledgeable of CAI from reading these newsletters (4 newsletters in all).

___9___ yes ______ no

2. Would you want these newsletters or communications like this continued?

___9___ yes ______ no

3. Was it helpful to cross-county communicate Orange/Seminole?

___9___ yes ______ no

4. What was the most helpful section of the newsletters (number in order of importance with #1 being most important)?

___3___ free material

___2___ conference dates/updates

___1___ helpful hints

______ evaluation of software

5. List your comments regarding the newsletter.

____

____

____

The terminal objective was that 35% of respondents would state that networking is helpful. All 12 educators (100%) stated it was helpful; thus, the objective was not only met but surpassed by 65%. (See Appendices M-P for complete newsletters).

The final and most important goal was the students progress. Tables 11, 12 and 13 show the growth of academic skills.

The results of the CAI class were an increase in reading, writing and math of 7.5% - 11.7% above the gains made by the non-CAI class as demonstrated by the pre and posttest results of the Seminole County Diagnostic Tool (See Appendix D).

The terminal objective was not only met, but surpassed.

The computer in the classroom did enhance the academic growth of the students.

This author looked for a 5% gain in the CAI class. As Table 13 indicates, students made a 11.6% gain over the non-CAI class in reading, a 11.7% gain in writing and a 7.5% gain in math. It must be noted that the teacher stressed basic skills and usually has a gain in her students; however, this year's gain was considerably higher than last year. The students were generally highly motivated to learn. (See Appendix Q for explanation of basic skills) The criteria for mastery was scoring 80% or better on each standard.

TABLE 11

Pre and Posttest Compilation of Basic Skills Assessment

CAI Classroom

Subject/ Standard	Pre # of students meeting Criteria	Post # of students meeting Criteria	# of student gain	% of gain
		n = 20		
READING				
A	17	20	+3	15%
B	16	20	+4	20%
C	9	18	+9	45%
WRITING				
B	17	20	+3	15%
G	14	20	+6	30%
I	4	19	+15	75%
MATH				
A	17	20	+3	15%
B	18	20	+2	10%
C	14	19	+5	25%
E	16	20	+4	20%
F	15	19	+4	20%
G	14	19	+5	25%
O	12	20	+8	45%
Q	17	19	+2	10%
T	10	18	+8	40%
V	4	16	+12	60%

TABLE 12

Pre and Posttest Compilation of Basic Skills Assessment

Non-CAI Classroom

Subject/ Standard	Pre # of students meeting Criteria	Post # of students meeting Criteria	# of student gain	% of gain
		n = 20		
READING				
A	17	19	+2	10%
B	15	18	+3	15%
C	9	19	+10	20%
WRITING				
B	16	18	+2	10%
G	15	19	+4	20%
I	7	18	+11	55%
MATH				
A	18	19	+1	5%
B	17	20	+3	15%
E	15	19	+4	20%
F	14	19	+5	25%
G	11	17	+6	30%
O	14	18	+4	20%
Q	15	18	+3	15%
T	11	16	+5	25%
V	6	14	+8	40%

TABLE 13

Comparisons of Students Academic Gains Between CAI Class and Non-CAI Class

Subject	CAI	Non-CAI	Difference
Reading	+26.6%	+ 15%	CAI + 11.6%
Writing	+ 40%	+28.3%	CAI + 11.7%
Math	+ 27%	+19.5%	CAI + 7.5%

Investigation of the results indicate that there were considerable gains made in the CAI class. Via software addressing skills of distinguishing between the real and unreal, and putting words in alphabetical order as well as reading comprehension skills, students on the computer scored a compilation of +11.6% higher than non-CAI students in reading and 11.7% higher in written skills that included classification, sequence and capitalization skills.

Math basic skills were 7.5% higher due to the students' remediation of addition and subtraction skills. The CLOCK software addressed the skill of time on the hour and half-hour. Students had additional assistance on the computer of solving word problems involving addition and subtraction.

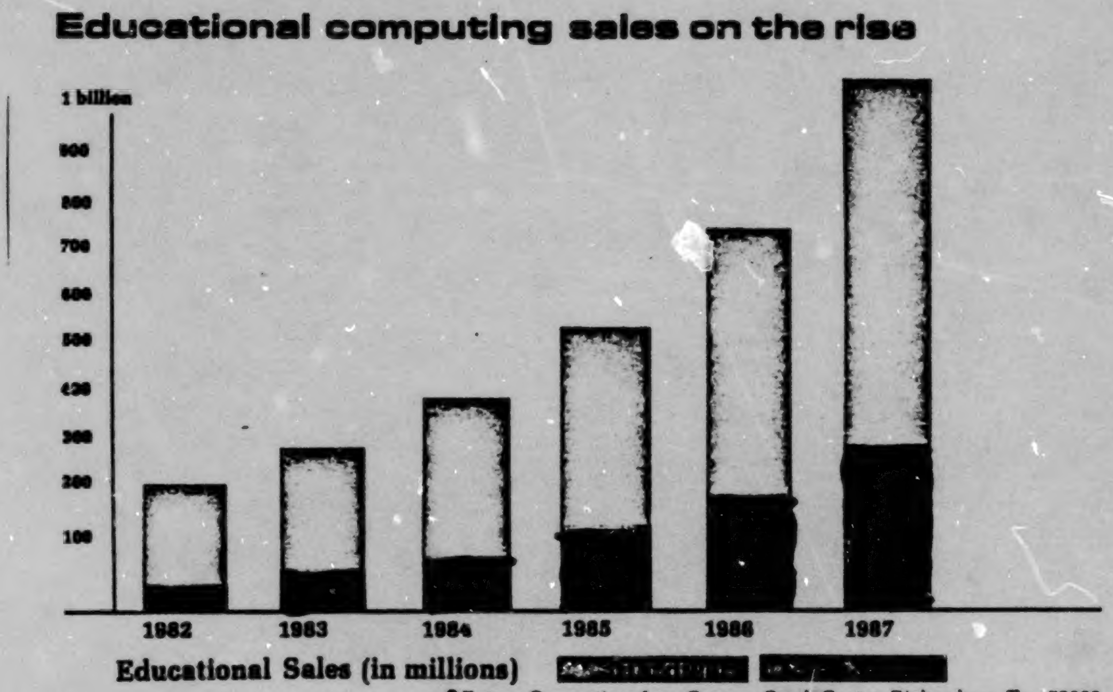
This author assessed that the students had higher motivation to achieve when working on the computer than working in the text or on a ditto sheet that addressed basic skills.

B. Conclusions Based on Data

A summary of the results of this practicum would indicate that all of the goals were successfully attained. The teachers became aware of CAI; the grade 2 teacher received inservice and experience to become a schoolbased leader in CAI; the computer was utilized to assist curriculum instruction with results of 5% or higher than a non-CAI class; the students increased their computer literacy; the community became knowledgeable of computers in education; and a network circle of CAI leaders was formed.

Upon investigation of both state and national activities with CAI, this author found that educational computing sales are on the rise. Figure 9 shows that both hardware and software will increase dramatically by 1987.

FIGURE 9



● Future Computing, Inc., Canyon Creek Center, Richardson, Tx., 75080.

In the State of Florida computer use is increasing. In the fall of every school year, the Management Information Services Section, Bureau of Program Support Services, Division of Public Schools, Florida Department of Education collects information on educational computing in Florida's public schools. All of the information is collected on a school-by-school basis on the School Summary Data Form (ESE 030) and summarized to produce district, regional and state totals in Tables 1-6 of this publication.

A total of 16,827 microcomputers were reported as being used for student instruction with all 67 school districts having at least one microcomputer in a classroom. The number of microcomputers in use is an increase of more than 167 percent from the total reported during the October, 1982 survey. The 16,827 micros are being used in 1,578 of the state's 2,347 K-12 public schools. Table 14 provides information, for 1982 and 1983, about the number of schools using microcomputers in support of specific subject areas.

TABLE 14

Florida Subject Area of Computer Use

Subject Area	1982 No. of Schools	1982 Percent Schools	1983 No. of Schools	1983 Percent Schools	Percent Increase
Computer Literacy	579	25	1116	48	93
Computer Programming	427	18	648	28	52
Reading/Lang Arts	377	16	805	34	114
Science	154	7	351	15	128
Mathematics	619	26	996	42	61
Social Studies	129	5	320	14	148
Exceptional Educ.	280	12	460	20	64
Guidance/Counseling	53	2	118	5	123
Vocational Educ.	203	9	332	14	64
Other Subjects	118	5	182	8	54

Table 15 shows a total of 421,626 students using microcomputers for instructional purposes; this is 28 percent of the state's total student membership in grades K-12 (up from 11.2 percent in October, 1982). Table 15 provides summary information about the types of schools using micros instructionally in 1982 and 1983.

TABLE 15

Florida Schools Using Computers

School Type	Students Served 82	% Total Served 82	Students Served 83	% Total Served 83
Elementary	64708	39.1	211938	50.3
Middle/Junior	49586	30.0	101811	24.2
Other Secondary	41204	24.9	83548	19.8
Comb. Elem/Sec	948	.6	6445	1.5
Adult/Voc	9019	5.4	17884	4.2
Total	165465	100.0%	421626	100.0%

Approximately 25.7 percent (up from 16.9 percent in October, 1982) of Florida's public schools are using micros for administrative purposes, including: school accounts, attendance accounting, FTE accounting, property records inventory, textbook inventory, grade reporting, student/instructional records and media management.

This author concluded that local school administrators must be leaders in CAI. Administrators are playing a larger role in the implementation of computer programs in schools, the latest study from the Johns Hopkins Center for Social Organization of Schools (CSOS) reveals. Moreover, the level at which decisions regarding the purchase and use of computers are made - whether by a single teacher, a group of teachers, the principal, or district administrators - can have an effect on the scope and success of the program, particularly in elementary schools.

The information comes from the fourth installment of "School Uses of Microcomputers," the six-part analysis of the January, 1983 CSOS survey of a nationally representative sample of about 1,600 microcomputer-owning schools.

In the past, the survey found, individual teachers were most often the ones to make the initial suggestion that a school invest in a microcomputer. The impetus is now tending to originate in more and more schools from administrators higher in the district hierarchy. Efforts to acquire additional micros for already existing programs, however, have always been and continue to be initiated primarily at the district level.

The route a school follows in acquiring hardware and implementing a computer progkram can influence the nature of the program.

The individual teacher is still most important in deciding how the micro will be used and in selecting software, though more and more teachers at single schools are sharing that responsibility. This can have quite an effect on the focus and breadth of the computer education program. Elementary school are more likely to concentrate their efforts on above-average students, usually in the form of programming classes, if a single teacher determines the computer curriculum. Those elementary schools in which computers are used most often, by the most students, and in the greatest variety of ways, are those in which a group of teachers leads the implementation process supported by the principal. Teachers in schools whose computer curricula are the results of a single teacher's efforts consistently see a less positive impact from computer programs than do teachers in schools whose programs are run by committee. The most successful programs appear to be those that are initiated by the principal and a group of teachers, who together choose which and how many micros to purchase.

CAI is not a program that will come and go. It is here to stay and principals must recognize this and embrace CAI with excitement and be committed to total staff development. This takes time and money, but both are worth it in order to serve the new generation of learners in the manner in which they not only need, but deserve.

C. Recommendations

1. Patience, time, effort, planning and commitment are needed to develop and implement a CAI program.

2. School-based inservice is of utmost importance and must be extended for one year for teachers to be able to not only learn computer uses but to feel less fearful of advance technology in the classroom.

3. School personnel should investigate private and public funding (grants, PTA) for additional computers and software.

4. Computer consultants should be brought in to give workshops to not only teachers but parents and students.

5. Schools should tap businesses to ask for computer specialists to donate time to instruct students in beginning programming.

D. Dissemination

This author developed a network circle of educators interested in CAI and will share his practicum with them. He will also share Chapter V with the Seminole County Program Director of CAI.

This author is considering a team approach (Grade 2 teacher, Media Specialist and himself) presentation of CAI at the 1985 Florida Computer Instructional Conference.

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APPENDIX A

Principal's Checklist on CAI

(1980 - 1983)

		YES	NO
1.	Staff Development for CAI OFFERED		x
2.	Staff evaluation input on computer software		x
3.	Budget allowing for computer purchase	x	
4.	One class having a computer to establish prototype classroom		x
5.	Parent workshop on CAI		x
6.	Professional Journals, texts on CAI available to teachers		x
7.	County Director of CAI available to staff		x
8.	Committee of teachers on CAI		x
9.	Network established of educators concerned with CAI		x

APPENDIX B

History of Computers

The Mark I, developed at Harvard University, was the first electromechanical digital computer and became operational in 1945. Several years later, in 1950, there were only 12 computers in the United States. By 1960, the number had risen to 6,000. Today there are more than 75,000 large general purpose computers and hundreds of thousands of microcomputers in use throughout the United States.

Not only have the numbers of computers increased, but there have also been dynamic advances in the complexity of the technology itself. Today's computers are hundreds of thousands of times faster, more reliable, and more cost efficient than the Mark I. (The Central Processing Unit of the Mark I cost $750,000 in 1944.)

Uses of computer technology in an information society are pervasive. They are used throughout the sciences, business, industry, government, transportation, law, medicine, and education. By 1978, more than 30 percent of all secondary schools utilized the computers for instruction, and computer literacy was being advocated as the fourth "basic skill" of the impending 21st Century.

The first educational application of the computer came in the area of school administrative functions. Such functions as payroll, tax accounting and attendance are essentially "business" related. With public business and industry utilizing computers cost effectively, it was only natural that this efficiency be taken advantage of in education. In the late 50s and early 60s, Computer Assisted Instruction (CAI) was introduced at selected sites across the country - generally at the university level. In the mid-60s, attempts were made to move CAI down to the pre-college students to increase the students' skill levels. However, CAI was still considered to be largely experimental. Cost of the computer equipment simply inhibited widespread utilization. The microcomputer system introduced in the 1970s has now placed the cost of CAI at a level where many school districts can afford its use. CAI is no longer a luxury of only a few but is now considered by many as a necessary supplemental source for quality education.

The computer revolution has provided job opportunities for hundreds of thousands. These employment opportunities and the need to learn about this new technology have caused school districts across the country to implement computer related curriculum. In the late 60s, courses entitled Computer Mathematics, Computer Data Processing, etc., were found in many of the country's schools. In the 80s Computer Literacy is a course which will likely be found at most schools and at several grade levels.

Computer technology reaches further and influences more than just CAI and computer instruction. During the past several years, new and improved methods of information delivery have helped to bring educational instruction to a great many individuals. Communication satellites have been used to transmit curricula and special programs to large urban areas and to such remote sites as Alaska, the Pacific Islands and the Appalachians. Such systems have also been used for satellite conferences and meetings between educational groups, government representatives, and student bodies. Telecommunications computer networks have facilitated the sharing of resources, course work, and scientific/educational research at all levels of education.

In a similar manner, "electronic blackboards" have linked instructors and off-site students without the need for costly travel. The development of videotapes and videodiscs and their computer interfacing may result in one-time investments for equipment capable of serving as high volume, interactive information storage and retrieval sources of educational materials. Television, via broadcast or cable contines to be a familiar medium for providing inexpensive mass dissemination of educational programs and learning experiences. The capabilities of interactive, computer-based television systems for educational purposes are being tested and put into operation in certain locales.

Technology in the classroom (and resistance to change) is not a new concept in the educational process. Books, blackboards, charts, maps, filmstrips, motion pictures, phonographs, tape recorders, and language laboratories can all be classified as instructional tools; and, for the most part, each is now widely accepted as an aid to teaching.

Newer forms of educational technology, and more specifically computers, have not yet fared as well in their acceptance. Some of the negative reactions may be due in part to the previous failure of such technologies to achieve their full potentials in educational areas during the 1950s and 1960s. The previous difficulties of integrating man-machine techniques into established teaching methods and the normal psychological resistance to change, coupled with expensive costs for implementation, have delayed wide-scale computer applications in education. Early support for computers can from the National Science Foundation (NSF), which in 1954 began to support computerized science education. The United States Office of Education also began funding research and demonstration projects in education that same year.

By the 1960s, many university campuses had received federal assistance, and by 1962, 200 colleges had established computer centers. In 1981, this author placed one Apple computer in his school for the direct purposes of beginning a Computer Assisted Instruction (CAI) approach.

Computer use in education was foreseen years ago; it arrives at last because computers have been improved and made smaller. Yet, many of the questions raised in the minds of those who foresaw what was coming remain unanswered. How will use of computers affect the child's development? What are appropriate languages for young children to use in talking with computers? What devices other than the traditional keyboard and screen or terminal/printer can, when attached to a computer, maximize its educational utility for the young child? What should teachers know about computers? How expert should a teacher be in computing to make reasonably effective use of it in teaching and learning? What is the teacher's role in a classroom where every student has free access to computing facilities? What is the impact of computer games on the child and what role should games have in school? When should the computer be used as a tool, when as a tutor, and when as a tutee?

Within a few years many children in America are likely to have at least one personal computer available to them. The potential impact upon schools staggers the imagination. At the least, it is likely to move the focus of education from the end product to process and raise visual and auditory forms of information to a status rivalling that of written language. Because ideas can be presented, explored, and expanded by human interaction with the computer, computing is certain to transform the schools from kindergarten upwards.

Since the arrival of the first electronic digital computer in 1945, educational researchers have studied its applications as an educational tool. Although some teachers are apprehensive lest they be completely replaced in our schools by impersonal computer terminals, even the severest critics of the present status of educational technology admit that the computer will eventually have a large impact on education. Most computer educators believe that there are important roles for the teacher which cannot be usurped by a machine: strengthening between student relationships, changing perceptions towards those about us, evaluating and encouraging artistic expressions; therefore, education must revolve around the teacher who will increasingly make use of the computer as a powerful teaching tool.

An educational tool is valuable only if it can help the teacher to do a better job than can be done without it. Films, television and slides are valuable because as educational tools they can help bring into the classroom experiences which the teachers cannot. The teacher weighs the availability, convenience, cost and effectiveness of these tools in deciding whether or not to make use of them for a particular lesson. What is it, then, that the computer can do that warrants its use as a classroom tool?

COMPUTER-ASSISTED INSTRUCTION (CAI)

Computer-assisted instruction, known most commonly by the letters CAI, refers to the use of computers in teaching. It does not involve teaching about computers, but rather, using computers as an aid in the classroom instruction of a particular subject matter. This author will refer often to the three strategies of utilizing computers in elementary schools: Drill and Practice; Tutorial; and Simulation.

DRILL AND PRACTICE

The simplest type of computer-assisted instruction is drill and practice. D&P doesn't really teach anything, it just gives practice in something learned in some other way. A common D&P program would be one that gives the student practice in using basic math skills. A crude program for addition would randomly select two numbers to be added, display the problem on the screen, and wait for the student to type in an answer. If the answer is correct another problem is presented; an incorrect answer usually means the computer will ask the student to try again. Two errors in a row means the student is given the answer. The computer then continues to give problems to be solved.

A more sophisticated type of drill and practice program that teaches touch typing is available from several companies. Most computers can run at least one version of the program. The better versions have several levels of practice and a number of sophisticated features. The beginning levels give the student practice on individual letters which are presented in groups of five or so. For a total beginner, several of the programs start by drilling on typing A S D F and G, the home keys for the left hand.

The beginner progresses through all the letters, numbers, and punctuation symbols on the keyboard and then begins to type words or letter groups followed by sentences and paragraphs. The program keeps track of errors and identifies characters a student has trouble with; it times work and prints out a speed in words per minute after an exercise. One version puts a color-coded display of the keyboard on the screen while the student gets started. If a word is left out during an exercise, the color of the word missed is changed. As the student becomes more proficient, the computer remembers troublesome words or letters and gives more practice on them. It is a friendly, convenient, effective way to learn touch typing.

Even fancier drill and practice programs select the difficulty level of problems on the basis of the student's performance during earlier sessions; they remember errors and give the student extra practice. If used in a school setting they may provide the teacher with printouts of individual student and class progress. A well-known educational publisher, SRA, (155 N. Wacker Drive, Chicago, Illinois 60606) markets a line of educational software packages that includes drill and practice programs for addition, subtraction, multiplication, and division facts. When teachers and students use these programs, the type and beginning difficulty level of problems can be selected by the teacher or the student. Once begun, the computer keeps track of the student's performance and moves on to more difficult problems when the student masters the current level. Drills can be timed if desired so that students try to "beat the clock" and still get the correct answer. The programs keep tract of students' performance and provide a printed record for the teacher.

There are also several interesting games which the students get to play if they do well on their exercise. SRA's material is a bit more than a drill and practice program. For example, it uses the graphics features of the computer to provide several types of "help" to students who don't quite understand how to do a problem.

SRA also has a program called Phonics which is designed to be used in conjunction with a basal reading program for students in the primary grades.

In the coming years, there are likely to be thousands of drill and practice programs available on a wide range of topics. (Educational Data Center, 1980)

TUTORIAL PROGRAMS

A tutorial program does more than Just give practice on something already Known. It actually teachers. At the college level, the organization Conduit distributes a number of educational programs that run on small computers. There are programs that teach a student to apply Newton's Second Law and the Law of Gravitation to satellite orbits and another that teaches matrix algebra.

At the high school and college level there is a large selection of tutorial programs for small computers. Subjects covered include U.S. history, accounting, psychology, physics, algebra, supervisory skills, counseling procedures, sociology, and business communications. There are also a number of programs that teach conversational French, Spanish, German, or Italian.

Educational computing programs that use a tutorial format rather than a drill and practice method are much more difficult to write, since you must teach the skill as well as evaluate learning. The number of tutorial programs available is not likely to increase quickly, but there are indications that a number of traditional educational publishers are preparing tutorial software for many of the required subjects at the elementary and high school level. 'The gifted program in many elementary schools utilizes the tutorial programs. (This author feels strongly that CAI should not be limited to one selected group, but that all children should and must have opportunities to become computer literate.)

SIMULATIONS

A program called Oregon Trail attracts the attention of both adults and children. Oregon Trail tells the group around the computer that they are on a wagon train leaving St. Joseph, Missouri, for Oregon. The program allows the group to make decisions on how much food, bullets, medicine, and clothing to buy. They then select a wagon and oxen team, pay for them, and head for Oregon. Along the way the wagon train can run into all sorts of problems - floods, hostile raiders, blizzards, broken wagons, and sickness. The settlers must decide how much food to eat each day, when to hunt, what to do when raiders appear, and whether to stop and buy provisions at the forts along the way.

The decisions made determine the likelihood of different types of problems occurring (e.g., eat poorly and you are more likely to become ill).

Oregon Trail is one of many simulations available today. A computer simulation puts the participant in a role and then requires decisions that have consequences. Most computers have a version of a simulation called Hammurabi that makes the player the ruler of an ancient city which has 1000 acres of land for cultivation, 100 citizens, and 3000 bushels of grain in storage. As ruler you must decide how much grain to give the people to eat, how much to save for seed, and how many acres to plant. Your decisions determine whether the kingdom starves or grows and develops (and requires more grain next year).

Another popular simulation is marketed under several names. It puts you in charge of a large nuclear power plant and requires you to run it successfully without an accident.

Simulations are widely used in business and industry. Nuclear and chemical plant workers are trained by computer simulationss. It is much less expensive to have a trainee blow up a make-believe plant on the screen than to make a real mistake while training in a real plant. Simulations are not only effective training tools, they are also fun. Many of the computer and arcade games that are so popular today are simulations designed for maximum enjoyment rather than as learning aids.

OTHER EDUCATIONAL APPLICATIONS

Computer literacy, drill and practice, tutorial programs, and simulations account for the great majority of computer applications in education today. Another approach, Computer-Managed Learning (CML), uses the computer as a manager or overseer of learning. For example, students may be given a series of assignments that require them to read certain sections of a text and do some work in the library. As the student finishes each assignment he or she sits down at the computer and takes a test over the assignment. A pass means the student can go on to the next assignment, otherwise the computer provides suggestions for further study. CML requires quite a bit of work for the teacher to arrange, but does not require the teacher to actually write programs that teach the student. In addition, CML makes sense when computer presentation of the material is not feasible or not efficient. The computer can still be used as an aid to learning even if it does not actually do the teaching.

In the future, computers may be used to identify the academic weaknesses of students through extensive diagnostic testing and to prescribe educational programs to meet a particular student's needs. They may also come to be considered useful tools in many classes, much as calculators have. In addition, the small computer holds great promise as an aid to physically handicapped students. Computers are already being used as communications devices by students who cannot speak. The future looks bright for educational computing whether it be in traditional classrooms or in a non-traditional setting such as the home.

As it exists today in 1983-84, there seem to be three major types of CAI systems for elementary grades: drill and practice; simulation; and tutorial. A teacher can present a concept to students which can be best understood and retained by repetitive practice. In this situation, a CAI drill and practice program is most helpful. When using a drill and practice, it is assumed that the material covered in the program has been previously discussed in the classroom. This type of CAI material is more easily acquired from outside sources than the other types, because it is the easiest form to write. Commercial software can be purchased for the intent of drill and practice.

Simulation programs are especially helpful in scientific experiments. Instead of using a lab for conducting these projects, the experiments can be performed in a simulated form using computers. Results of the experiment are displayed on the terminal screen. Simulation adds new dimensions to experiments and to their use in teaching, because it makes visible many very small, very slow, or very rapid changes which cannot be observed in actuality. The time scale of events can be expanded or contracted thousands of times. Simulation programs are not limited to science, but may be included in teaching sociology, medicine, statistics, business, mathematics, journalism, and others.

CAI tutorial systems present material to the student, and then asks him/her to answer questions concerning the information. It is not assumed that a student has prior knowledge of a subject. In some exercises, printed material is provided along with the computer program so that the student has something to study when away from the terminal. If a student correctly answers questions over the material, he/she may progress through the program at a rapid rate. If a correct answer is not given, he/she is branched to another part of the program which will give additional help on the material. Tutorial systems maybe used either independently of, or in conjunction with, the classroom teacher. They provide an excellent approach in helping students with make-up work.

Two additional terms often heard when discussing types of CAI are adjunct and primary. Adjunct CAI supplements the learning process by supporting or illustrating concepts. One example of adjunct CAI might be a drill and practice program which is short in duration and supported by instruction in a regular classroom. Primary CAI can be independent of classroom instruction and is usually longer in duration.

An historical overview is not complete unless mention is made of CAI development.

Dartmouth, Stanford, and Florida State University were early leaders in the field of CAI with their work beginning in the late 50s and early 60s.

Florida State used a newly developed high-level CAI language called Coursewriter to implement complete university level courses in physics and statistics. At the same time, Dartmouth developed the BASIC language, a simplified programming language that could be easily learned. This language aided in the development and usage of CAI because of its simplistic nature. In the mid-60s, Stanford took a new approach by applying CAI in a different area. Rather than working with university students, they worked with pre-college students in an effort to increase the child's skill levels in English and math. (Morlan, 1974)

In the 70s, interest in CAI continued to spread throughout the United States, and even more progress is expected in the 80s. The Minnesota Educational Computer Consortium at Lauderdale, Minnesota, is involved in a continuing program for both college and pre-college students. Among its most useful projects is an extensive study comparing the cost, capabilities, and educational uses of microcomputers. This study, and others like it, has shown that the development of the microcomputer may be the technological breakthrough which will allow CAI to be accessible to most classrooms in the near future.

California State University at Fresno is involved in acquiring, modifying, and sharing quality CAI materials in a wide range of fields. Many of their programs have been distributed to schools across the United States. Also producing a significant amount of software has been the University of California at Irvine, under the direction of Alfred Bork.

One of the most established CAI projects in the world is the PLATO system, which is funded by the National Science Foundation. Three major PLATO installations are located at the University of Illinois, Florida State University at Tallahassee, and the University of Delaware, with other smaller installations scattered about the country. PLATO uses the high level language, TUTOR, which enables programmers to produce complex CAI material including such features as animation and voice output. The designer or author of a CAI lesson does not have to be a computer programmer. Although programming languages such as BASIC may be used for CAI development, most computer systems have available an "authoring" software package. Such a package is designed so that teachers with little or no programming experience can develop CAI courseware. PILOT, Coursewriter, IDF and TUTOR are some example package names.

Various CAI authoring packages differ in some respects. However, all are designed for easy use. The teacher or author is generally "prompted" by the package to provide textual material, questions, answers, responses to correct answers, wrong answers, responses to wrong answers, hints, etc.

The primary function of the author is to design good interactive instructional material while the package does the "programming" part.

After the CAI lesson has been developed, the package then administers the lesson to the students. Statistics such as the number of correct answers, the number of hints given, etc., may be retained by the package and later provided to the teacher.

APPENDIX C

Informational Technology and Its Impact on American Education Advisory Panel

Willis Adcock
Assistant Vice President
Texas Instrument Inc.

Joel N. Bloom
Director
Franklin Institute
Science Museum and Planetarium

Colleen Cayton
Maxima Corp.

Robert L. Chartrand
Congressional Research Service

Mark Curtis
President
Association of American Colleges

L. Linton Deck
Fairfax County Schools (Virginia)

Sam Gibson
Bank Street College

Harold Howe, II
Harvard Graduate School of Education

Robert Hoye
Director, Instructional Technology
University of Louisville

Judith Lozano
Superintendent of Southside School District
San Antonio, Tex.

Maurice Mitchell
Chairman of the Board
National Public Radio

Sarah Resnick
President
Media Systems Corp.

Vic Walling
Stanford Research Institute

Nellouise Watkins
Director, Computer Center
Bennett College

Joe Wyatt
Vice President for Administration, Harvard University

APPENDIX E

Pretest Tabulation Sheet

	# of students achieving mastery
Reading	
Skill A	____
Skill B	____
Skill C	____
Writing	
Skill B	____
Skill G	____
Math	
Skill A	____
Skill B	____
Skill C	____
Skill E	____
Skill F	____
Skill G	____
Skill O	____
Skill Q	____
Skill T	____
Skill V	____

APPENDIX F

Posttest Tabulation Sheet

Reading	# of students achieving mastery
Skill A	____
Skill B	____
Writing	
Skill B	____
Skill G	____
Math	
Skill A	____
Skill B	____
Skill C	____
Skill E	____
Skill F	____
Skill G	____
Skill O	____
Skill Q	____
Skill T	____
Skill V	____

APPENDIX G

PRE AND POST.

TEST FOR COMPUTER AWARENESS

GRADE 2

Circle Your Answer

1. Computer hardware means:
   - A. the table and chair
   - B. the computer machine
   - C. the tools to fix a computer

2. Computer software means:
   - A. the diskettes for the computer
   - B. the cotton used in packing
   - C. the cushion for the chair

3. Apple II means:
   - A. a fruit
   - B. the company's name of a computer
   - C. a reading lab

4. To turn on the computer at school you:
   - A. press the space bar
   - B. ask the teacher
   - C. press the switch in the back of the machine

5. A floppy diskette is a:
   - A. record for a record player
   - B. soft towel
   - C. program disk for the computer

6. A cursor is:

   A. the rectangle on the computer that moves

   B. the on switch

   C. not a nice word

7. LOGO is computer talk is:

   A. a picture

   B. a program

   C. the name of the machine

8. A computer can:

   A. think

   B. store information

   C. make up pictures by itself

9. TRS 80, LISA and Atari 1600 are all:

   A. video games

   B. computers

   C. STAR WARS characters

10. Who will use computers?

    A. bankers

    B. teachers

    C. everyone

ANSWERS

1 - B
2 - A
3 - B
4 - C
5 - C
6 - A
7 - B
8 - B
9 - B
10 - C

APPENDIX H

Teacher Evaluation for CAI

(Grade 2 teacher implementing CAI)

1. CAI has been used mainly for:

_____ A. Remediation

_____ B. Tutorial

_____ C. Simulation

2. Put number 1 - 5 next to the subject areas indicating your most use CAI in that discipline. ex. 1 = CAI used the most; 2 = CAI used the mext, etc.

_____ Basic Reading Skills

_____ Reading Comprehension

_____ Math Basic Operations

_____ Math Problem Solving

_____ Creative Writing

_____ Language Arts Skills

_____ Social Studies

_____ Science

3. Did you have anxiety about implementing a CAI program?

_____ yes _____ no

4. If yes, has this anxiety diminished?

_____ yes _____ no

If no, what would you include? ______________________________

____

____

5. Did CAI motivate students to learn?

_____ yes _____ no

6. A. Did CAI assist lower achievers?

_____ yes _____ no

B. Did CAI assist average achievers?

_____ yes _____ no

C. Did CAI assist high achievers?

_____ yes _____ no

7. Were do you think the computer should be houses? (check one)

_____ Media Center

_____ Computer Lab

_____ Classroom

8. Do you want increased staff development on How to Use the Computer?

_____ yes _____ no

9. Did CAI assist high achievers?

_____ yes _____ no

10. Indicate by 1, 2, 3, 4, and 5 the students who benefited by CAI utilizing #1 as most assisted, etc.

_____ high academic achievers

_____ average

_____ low

_____ discipline problem students

_____ all students

11. Indicate by a check the percentage of students that could work independently on the computer.

_____ 100 percent

_____ 90 - 99

_____ 75 - 90

_____ 50 - 75

_____ 25 - 50

_____ 0 - 25

12. What subject area did you observe your students were most succussful after CAI.

_____ Reading

_____ Math

_____ Social Studies

_____ Science

13. Did student's independent work on the computer distract you from teaching others?

_____ yes _____ no

14. Was class distracted by the student on the computer?

_____ yes _____ no

15. Was computer audio a distraction to you?

_____ yes _____ no

16. Was computer audio a distraction to class?

_____ yes _____ no

17. Were parents pleased that a computer was in your classroom?

_____ yes _____ no

18. Did your planning time increase due to CAI?

_____ yes _____ no

If yes, by now much per week?

_____ minutes

19. Do you want the computer in your classroom next year?

_____ yes _____ no

Why? ____

____

20. How many students in your class have a home computer?

_____

21. How many students had a home computer last year?

_____

22. Please comment on the CAI program you implemented in your class, and give your opinion of the value, if any, of schoolwide CAI program.

____

____

____

____

____

____

APPENDIX I

Teachers (K-5) Questionnaire for
(CAI) Computer Assisted Instruction

1. Is the County Computer Inservice preparing you to implement a CAI program?

_____ yes _____ no

2. Do you think computers should be used in elementary schools?

_____ yes _____ no

3. Indicate by #1, 2....the grades CAI should be used. #1 = first choice, #2 = second, etc.

_____ K
_____ 1
_____ 2
_____ 3
_____ 4
_____ 5

4. Indicate by #1, 2 and 3 the reason to use CAI.

_____ remedial
_____ tutorial
_____ simulation

5. Indicate by 1, 2, 3 the subject areas that should concentrate on CAI, #1 = most concentration, etc.

_____ Reading
_____ Math
_____ Social Studies
_____ Science

6. Do you have anxiety about using computers as a teaching tool?

_____ yes _____ no

7. Are you more knowledgeable of CAI after this staff development activity?

_____ yes _____ no

8. Additional comments.

____

____

____

____

APPENDIX J

Principal's Assessment of Students in Grade 2 Implementing a CAI Program

(daily checklist) total of 120 times

	yes	no
1. A student was at the computer		
2. Student was working independently		
3. Student was working on math		
4. Student was working on language arts		
5. Student was distracted by my presence		
6. Student was on task		
7. Student was day dreaming		
8. The class was distracted by a student at the computer		
9. Computer audio distracted teacher		
10. Computer audio distracted class		

APPENDIX K

Parent Evaluation of
Computer in Education Workshop

1. The Computer Workshop was: (check one)

_____ excellent

_____ satisfactory

_____ poor

2. Would you want another Computer Workshop?

_____ yes _____ no

3. Do you think computers should be used in elementary school?

_____ yes _____ no

4. Do you want your child to know how to work on the computer?

_____ yes _____ no

5. Would you want a computer in each classroom?

_____ yes _____ no

6. Check which group of students should use the computer.

_____ high achievers

_____ average students

_____ low achievers

_____ all students

7. Do you have a home computer?

_____ yes _____ no

8. Did this workshop make you more aware of the use of computers in the elementary classroom?

_____ yes _____ no

9. Additional Comments ______________________________

____

____

____

____

____

APPENDIX L

Evaluation of Networking Circle

1. Did you become more knowledgeable of CAI from reading these newsletters (4 newsletters on all)?

_____ yes _____ no

2. Would you want these newsletters, or communications like this continued?

_____ yes _____ no

3. Was it helpful to cross-county communicate Orange/Seminole?

_____ yes _____ yes

4. What was the most helpful section of the newsletters: (number in order of importance with #1 being most important).

_____ free material

_____ conference dates/updates

_____ helpful hints

_____ evaluation of software

5. List your comments regarding the newsletters.

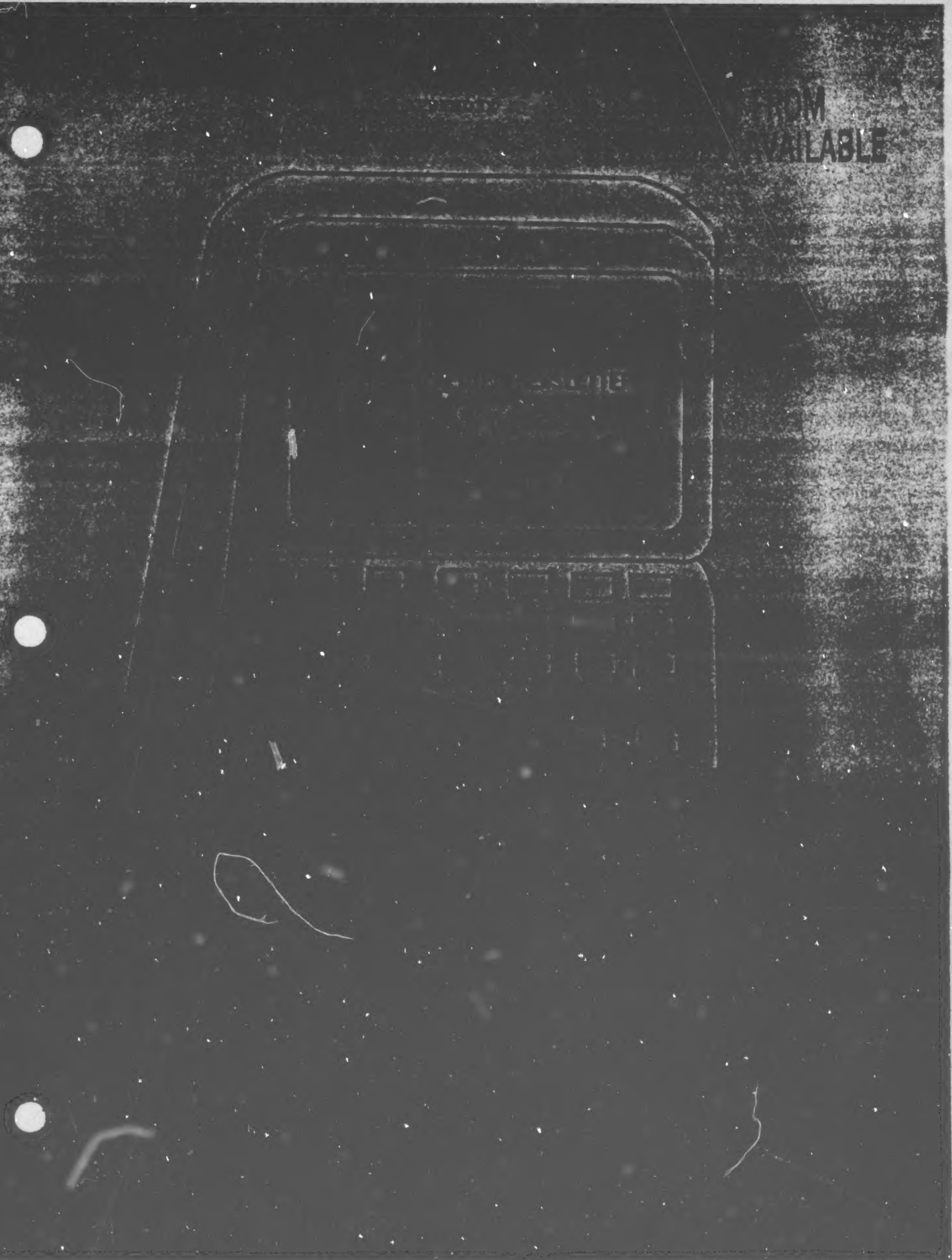
____

____

____

____

____


FROM
AVAILABLE

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Thank you for your cooperation-

Freeman Baggett

INSTRUCTIONAL COMPUTING

NEWSLETTER

From: Freeman Baggett, Principal

Published by:
English Estates Elementary
Oxford Road
Fern Park, Florida 32730
(305) 831-1416

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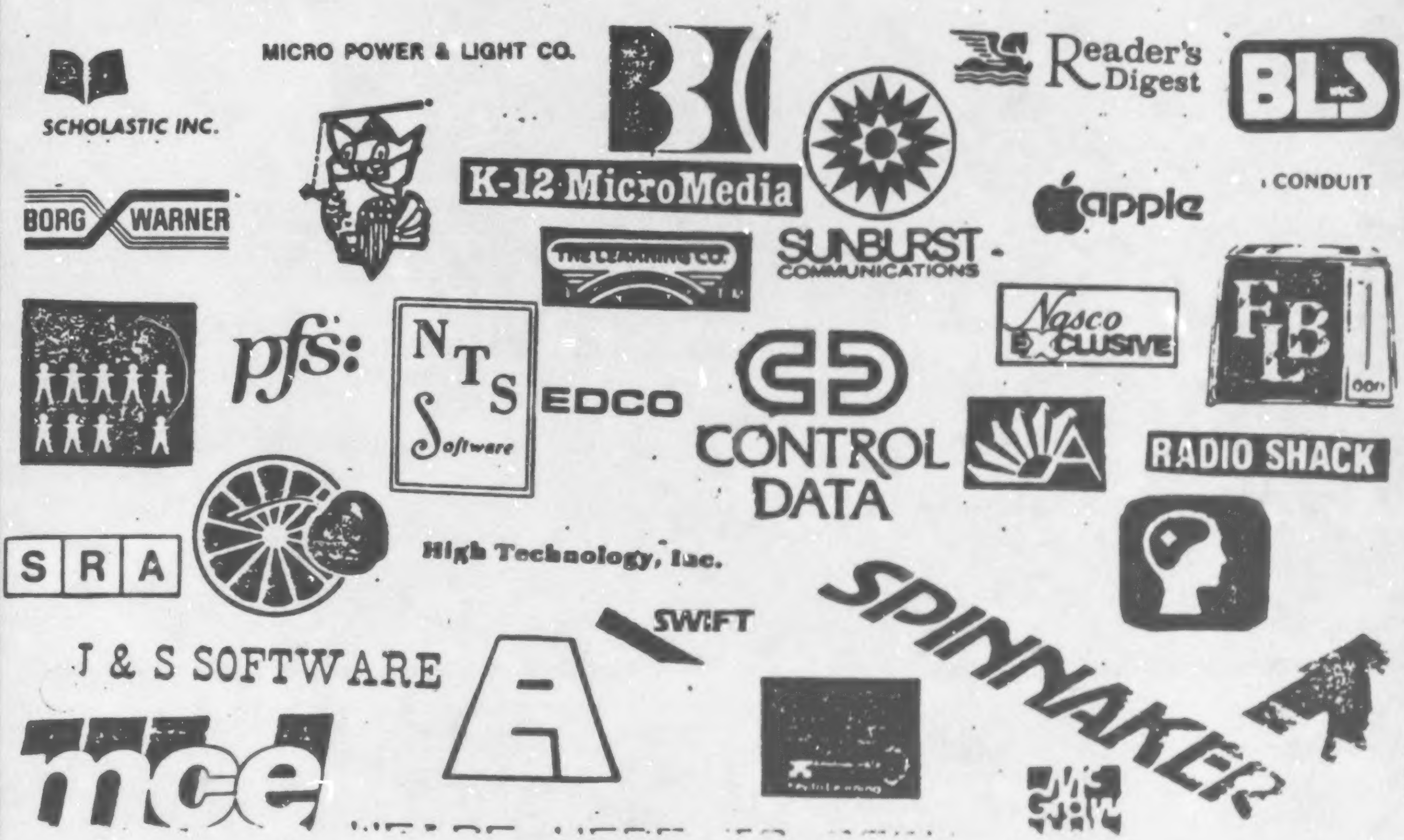
SCHOLASTIC INC.
MICRO POWER & LIGHT CO.
Reader's Digest
BLS
K-12 MicroMedia
apple
CONDUIT
BORG WARNER
THE LEARNING CO.
SUNBURST COMMUNICATIONS
Nasco EXCLUSIVE
FLB
pfs:
NTS Software
EDCO
CONTROL DATA
RADIO SHACK
SRA
High Technology, Inc.
SWIFT
SPINNAKER
J & S SOFTWARE
mce

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FREE APPLE "COMPUTER CLUB" KITS.

Apple is offering free Computer Club kits. One per school.

Any school interested should send a letter requesting a kit on school stationery and signed by the principal. Also in the letter, state the name of the person in charge of the club and whether the kit is for elementary or secondary level students. Send your request to:

Apple Computer Clubs
Box 948
Lowell, MA 01853

For additional information, contact your local Apple dealer.

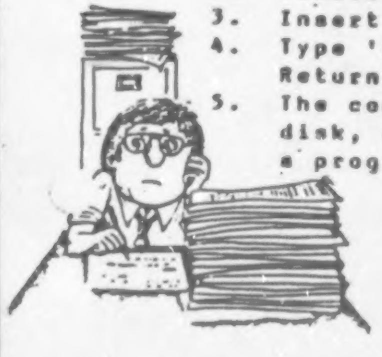
INITIALIZE A DISK?

Before any program can be saved to disk on the Apple or TRS-80, the blank disk must have been initialized.

Apple: How to Initialize a Disk

Easy:
1. Boot System Master in Drive 1.
2. Remove system master.
3. Insert blank disk.
4. Type New. Press Return.
5. Type a short "Hello" program. Press Return. Example: 10 Home: Print CHR$ (4); "Catalog"
6. Type 'Init Hello'.
7. The computer initializes the disk so that when it is 'booted', the contents or catalog of the disk comes on the screen first.

Easier:
1. Boot system master in Drive 1.
2. Remove system master.
3. Insert blank dish in Drive 1.
4. Type 'Init Hello'. Press Return.
5. The computer initializes the disk, setting it up to accept a program or data.



SHARING
COMPUTER
KNOW HOW...

SHARING COMPUTER KNOW HOW...
RADIO SHACK HAS CLASSES

As a service to educators, the Radio Shack stores nationwide provide classes in Basic Programming at no charge. School personnel have been requested to confirm their class reservations prior to the starting date of that class. Anyone unable to attend after having confirmed a seat is urged to call the Radio Shack store where the class is scheduled. Radio Shack has a waiting list for each class and would appreciate being notified of a cancellation.

COPY/BACKUP PRACTICES

Most software companies agree that copies of program and data disks should be made for archival purposes. Use the copy programs that are on the system master or one of the many programs available on the market.

If a disk is copy-protected, ask the company about its backup policies. Many companies offer a backup disk for less than the cost of the original.

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STUDENT WORK PAGE

COMPUTERS

New School Tool

In 1982, only about 5,000 elementary schools had computers. Now, more than 14,000 schools have them.

Alan Tse and Monique Dandridge are both fifth graders from San Francisco, CA. What else do they have in commom? They both want to learn how to use computers to help them on the job when they grow up.

WHY COMPUTERS?

Computers are here now, and they will be a part of the future,too. That's why more and more schools are getting computers.

Alan wants to be an electrical engineer someday. He says, "A computer would tell me how to fix electrical switches."

Monique wants to be a doctor. She would use her computer to "Keep track of medicines my patients take."

FIRST THINGS FIRST

You don't need to have computers in your school to learn about them. Once a month, on this page, you will learn some computer basics.

What is a computer anyway? A computer can: (1)put information and numbers into; (2)tell to do arithmetic; (3)set up to help you practice schoolwork;(4) tell to store one or more facts or numbers; get answers from.

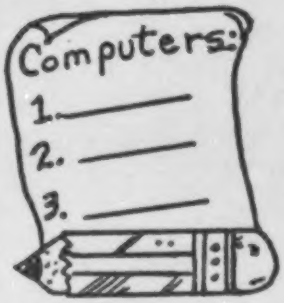
You can do all these things with computers. But computers cannot yet think or feel as people do.

COMPUTER CHALLENGE

Now you know some things a computer can do. Look at the list below Cross out what you think a computer can't do.

GIVE ANSWERS MAKE FRIENDS STORE FACTS

A word from educators about computers:



Bobby Goodson, Computer
Resource Teacher, Cupertino
Union School District, Cupertino, CA

"We are getting past the initial fascination with technology, and are beginning to see the teachers accept it as their own, using it with the same originality and creativity they have always used in the classroom."

Ron Mincio, Classroom Teacher for the gifted, Bay Shore Public School System, Bay Shore, NY.

"Computers and students both require carefully thought out input for best results."

Beth Lazerick, Coordinator of Computer Education, Shaker Heights School District, Shaker Heights, OH

"Money can't buy computer literacy for our students. Only teachers can do that."

Dr. Gary Bitter, Professor of Computer Education, Arizona State University, Tempe, AZ.

"It is becoming obvious that computer literacy is as important as reading, writing, and arithmetic. In order to be employable and exist in today's world, as well as tomorrow's, one must be computer literate. This includes both awareness of the role and impact of the computer on our lives, as well as knowing how to tell it what to do, which is programming the computer."

Form A

Software Evaluation

Type of Computer Application (Check one or more)

_____ Drill and Practice
_____ Remediation
_____ Other (explain on reverse side)
_____ Tutorial
_____ Enrichment

Please Check One Box for Each Category		Excellent	Good	Fair	Poor
Instructional Quality	Clear instructions on screen				
	Maintains student interest				
	Language at appropriate grade level				
	Level of difficulty is appropriate for target group				
	Appropriate feedback given to students				
	Graphics/color/sound are used for valid instructional purposes				
Technical Quality	Ease of entry and exit				
	Displays on screen appropriate in size and clarity				
	Users can easily and independently operate the program				
	Program is reliable in normal use				
Content	Career implication understood				
	Content is accurate				

General Comments from students

INSTRUCTIONAL COMPUTING

NEWSLETTER

[illegible] Elementary
[illegible] Road
[illegible] Park, Florida 32730
(30[illegible]) 831-1416

[illegible]ROM
[illegible]LABLE

Greetings,

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Thank you for your cooperation-

Freeman Baggett

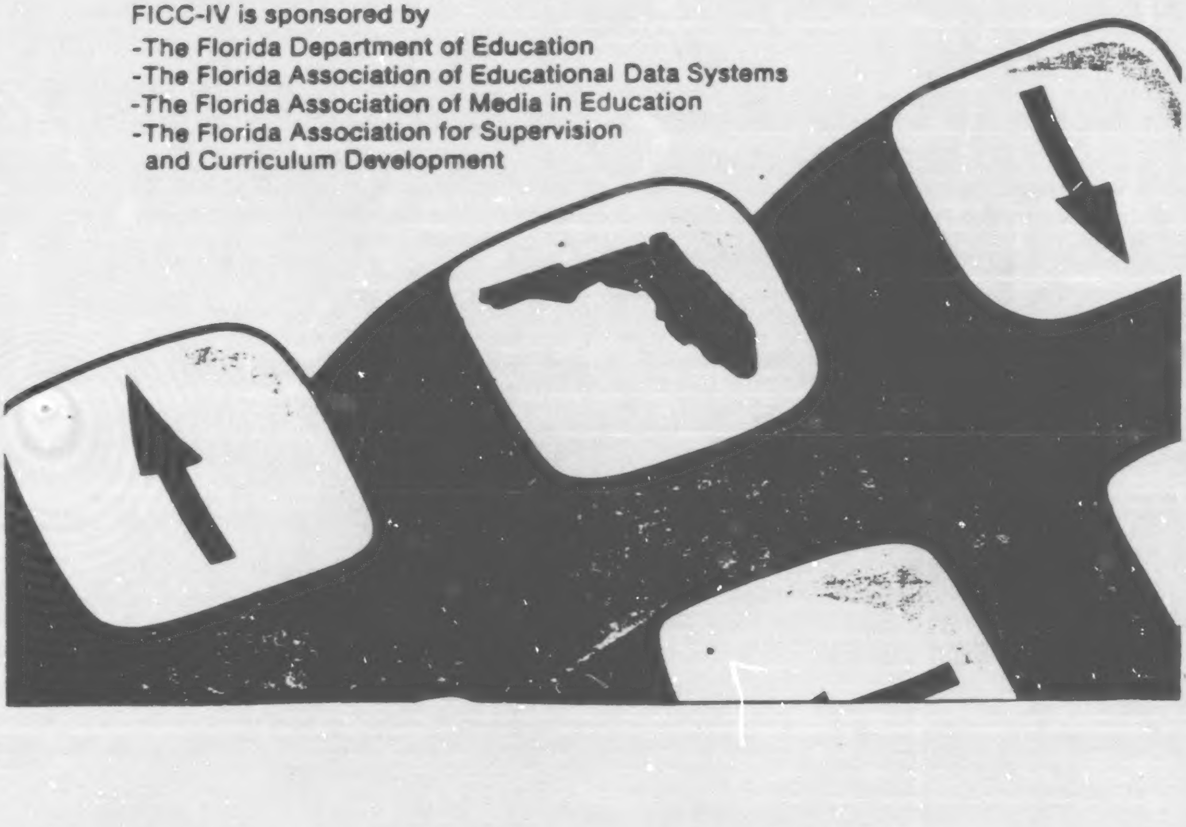
REMEMBER...

CALL COUNTY OFFICE FOR REGISTRATION INFORMATION...

The Fourth Annual Florida Instructional Computing Conference

February 7-10, 1984
Sheraton Twin Towers Convention Center, Orlando

FICC-IV is sponsored by
-The Florida Department of Education
-The Florida Association of Educational Data Systems
-The Florida Association of Media in Education
-The Florida Association for Supervision
and Curriculum Development



AWARDS ANNOUNCED FOR MICRO COMPUTER PROJECTS

Close to $130,000 worth of microcomputer-based systems will be presented to 22 educational groups by the Foundation for the Advancement of Computer-Aided Education, according to foundation chairman Gregory Smith. The award program, administered by the nonprofit corporation, originally chartered as the Apple Education Foundation in 1979, is held twice a year and is intended to support and develop new methods of learning through the innovative use of small computers.

In discussing the latest awards, foundation spokesperson Peggy Redpath noted that there were 180 applicants this award period, considered a low turnout. "This probably due to the time of the year," she stated. "As the summer approaches we usually have twice as many individuals and groups applying." Annual grant budget is approximately $300,000, with each one averaging around $5,000 and based on need.

Twenty-eight microcomputers were awarded this grant-cycle. Most were Apple II personal computers, manufactured by Apple Computer, the foundation's principal sponsor. Other major contributors to the program are Advanced Business Technology, ABW Corporation, Heuristics Inc., Integral Data Systems, Inc., Interactive Structures Inc., M and R Enterprises, Mountain Computer Inc., Personal Software Inc., Regis Microcomputer Products, Softward Publishing Corporation and Videx Corporation.

To obtain a grant application, contact the Foundation for the Advancement of Computer-Aided Education at 20863 Stevens Creek Boulevard, Cupertino, CA 95014; or call Peggy Redpath at (408) 255-3295.

BASIC SKILLS TELE-NETWORK SET UP

The United States Department of Education has awarded an $855,000 contract to the Association for Educational Communications and Technology (AECT) to develop a states-based telecommunications network to disseminate information about the teaching of Basic Skills. According to AECT Executive director Howard Hitchens, Project BEST (Basic Education Skills Through Technology) will facilitate the work going on in basic skills at all levels.

BLISSYMBOLS FOR NON-VERBAL CHILDREN

Without effective communication and language skills, meaningful education is impossible. For this reason, special communication and language learning systems have had to be developed for non-verbal severely physically handicapped children. For younger children or for mentally retarded children ; these systems usually take the form of some type of pictographic system. These systems, although easy to learn, are by their pictographic nature very difficult to incorporate into any self-practice or computer aided learning programs.

FREE MATERIALS

Focus on Quality Spring 1984

Catalog. This catalog lists over 300 programs for the Apple, Atari. TRS-80, Commodore, IBM-PC and TI-99/4A microcomputers. Topics range from problem solving to science and from library circulation programs to math. Write: The Micro Center, Dept.EE., P.O. Box 6, Pleasantville, N.Y.,10570; or call 800/431-2434 (in New York, Canada, Alaska and Hawaii call collect: 914/769-6002.

Fall/Winter Catalog of Software

This catalog contains listings of Apple educational software and includes simple authoring systems for teachers to create tests/lessons, an inventory system for administrators, secondary science offering, a comprehensive computer literacy program and new programs in geometry.

Write: Educational Courseware
Dept. EE
67A Willard Street
Hartford, Ct., 06105

DON'T BOTHER ME,
I'M LEARNING

COMPUTER LINGO

DATA PROCESSING - Organizing basic information to be handled by routine procedures.

HARDWARE - The actual equipment, electronics and mechanics.

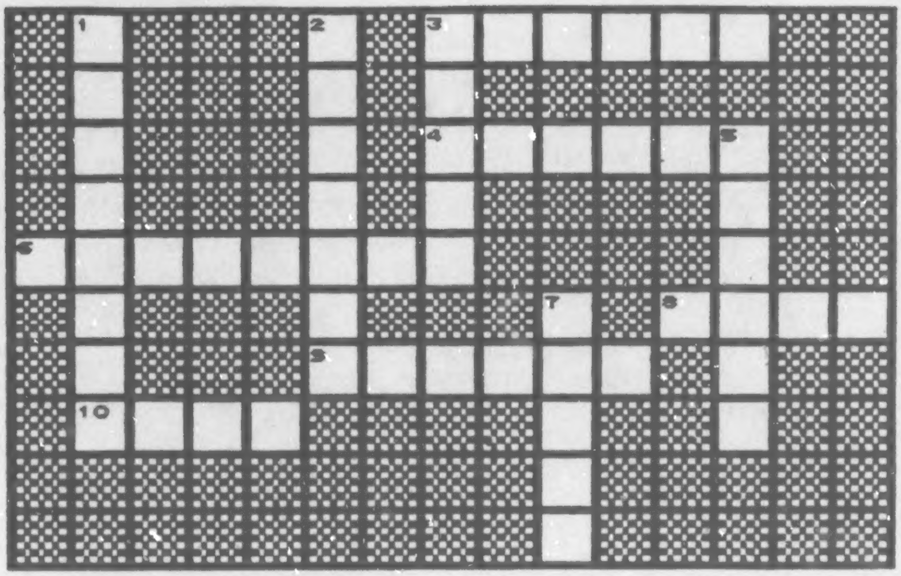
SOFTWARE - The directions that make the hardware perform tasks. A computer program plus the procedure for their use.

BATCH SYSTEM - The use of the computer for processing information as resources become available.

INTERFACE - A connecting device; a place where two or more independent systems meet and interact with each other; as, the interface between a computer and printer.

BY CROSSWORD MAGIC

Answer Key inside

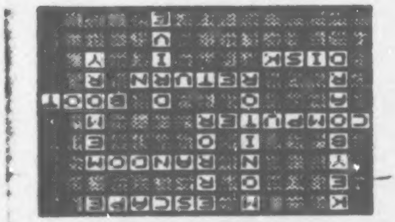


ACROSS CLUES

3. GET OUT OF A PROGRAM
4. NOT IN ANY ORDER
6. APPLE - RADIO SHACK - ET AL.
8. GETTING STARTED
9. PRESS THIS ON APPLE TO ENTER DATA
10. 5 1/4" FLOPPY

DOWN CLUES

1. HANDS-ON DATA ENTRY DEVICE
2. VIDEO DEVICE
3. I/O AND SYNTAX ARE THIS
5. RECALL FROM HERE
7. WHERE TO PUT 10 ACROSS



PRACTICAL SUGGESTIONS FROM ORANGE COUNTY PUBLIC SCHOOLS

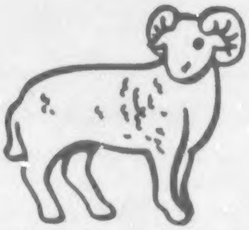
Disk Drive Cleaner Kit— Disk drives should be cleaned periodically to maintain operating reliability. It's a simple procedure. 5 1/4" and 8" disk drive head cleaning kits are available from most computer dealers for about $25.00.

Suggestion

Preview materials throughout the year, regardless of price, develop a "wish list" for software that would benefit the students.

Funds become available at odd times during the year and most often must be used within a specified time.

Having a list of needs ready will elimiate last minute panic.



COMPUTER "RAM"

If you must leave a floppy disk in your car for any period of time, insulate with styrofoam packing sheets.

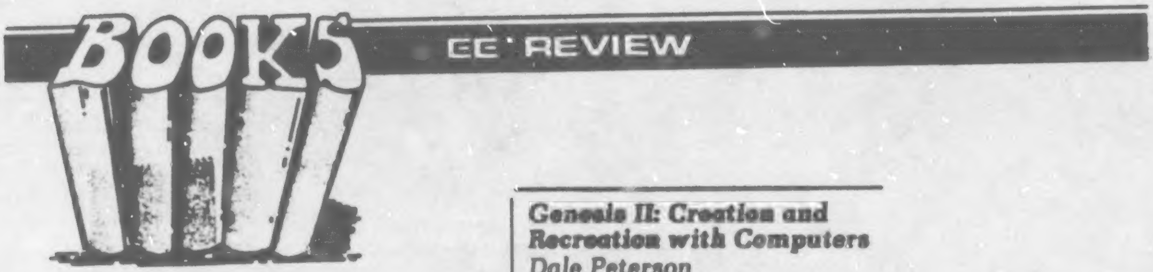
Metal objects near your floppy disks could damage them. Be careful where you store them.

Do not put your disk drive on top of the computer keyboard, it could demagnetize your disks.

Label your disks promptly, using only a soft-tip pen if writing on disk jacket.

You can use the other side of a floppy disk by notching the edge directly opposite the original notch with a standard hole punch. However, for a program that is used frequently, using the "flippy" side is not recommended. (There is also the possibility that the "flippy" side might be defective.)

If at all possible, buy a power surge protector (an electronic protection device that provides multiple outlets for the computer and peripherals) for your computer. It is especially important in institutional settings where power abnormalities are more common. The devices also offer the benefits of having multiple



Genesis II: Creation and Recreation with Computers
Dale Peterson
Reston Publishing Company,
11480 Sunset Hills Road,
Reston, Va., 22090. 1983, $24.95
(cloth), $15.95 (paper).

Genesis II takes the reader on an exciting and enchanting discovery of the computer as a new artistic medium.

The Prologue sets the stage for the wedding of the artist to technology. Here Peterson gives us a historical account of that relationship over the centuries. For example, we learn that artists have depended on such technological advances as the creation of easels in the 12th century, oil-based paints around the 14th century, lithography, premixed paints in tubes (1840) and pre-stretched and primed canvasses in the 1850s. And music? Who can separate Bach from the mechanical design of the organ or, in fact, all musicians from the technology and development of instruments? Finally, we realize that the industrial revolution introduced a whole new dimension of art and machines. How many paintings of the Eiffel tower have you seen?

After the historical overview of the arts and technology, Peterson shows the reader how the computer has added a new dimension to creativity in light, sound symbol and recreation over the past ten years. An eight-page, full-color insert contains reproductions of well-known computer-generated works of art and, finally, the author introduces you to the creative artists, musicians, poets and authors who use computers in community art, television and film.

If *Genesis II* doesn't make converts of the people who feel that computers are "up to no good," it will certainly reveal the creative aspects of this incredibly versatile machine

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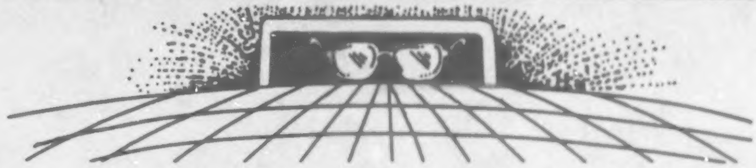
LOOKING AHEAD...



FEBRUARY 15-17
Second Conference on Interactive Instruction Delivery, Orlando, Fl.—The topics are on technology transfer in education and training and on the use of microcomputers, video disks and telecommunications to enhance education and training. **Call: 703/347-0055.**

FEBRUARY 21-23
Softcon, New Orleans, La.—A trade show and conference for the software industry which will include everyone who buys, sells, develops or markets software. More than 1700 exhibits are featured. **Call: 800/841-7000.**

FEBRUARY 22-24
Sixth National Conference on Communications Technology in Education and Training, Washington, D.C.—Policy, planning and management issues confronting educators and trainers using or exploring the possibilities of technology for instruction will be the principal thrust of this show. **Call: 301/593-6650.**

FEBRUARY 22-25
Mid South Association for Educational Data Systems (AEDS) Eleventh Annual Conference, New Orleans, La.—The theme is "Computers Now! The Future is Today." **Call: 504/342-1888.**

FEBRUARY 25-26
Computers and Reading/Learning Difficulties, San Francisco, Ca.—Seminars and workshops specifically targeted for computer use in reading, language arts and learning difficulties. **Call: 415/222-1249.**

FEBRUARY 28-MARCH 2
1984 Association for Children with Learning Disabilities (ACLD) International Conference, New Orleans, La.—Highlighting the conference will be a pre-conference computer workshop and computer sessions for administrators, faculty and special users. **Call: 302/738-6161.**

FEBRUARY 29-MARCH 3
Texas Computer Education Association (TCEA), Austin, Tx.—The theme of this conference is "Computers in the New Curriculum." **Call: 512/255-6300.**

MARCH 2-3
Computers in the Classroom, Cincinnati, Oh.—This conference includes field site visits, exhibits and a wide range of sessions on educational applications of computers. **Call: 513/523-2283.**

MARCH 5-6
CAI Workshop, Washington, D.C.—The purpose of this workshop is to introduce managers to the reality, problems and potentials of high technologies. **Call: 703/892-4100.**

MARCH 7-9
Computer Based Training Workshop, Washington, D.C.—Identifies the process any organization must complete when considering CBT as a training solution. Attendees will deal with a series of decision making strategies. **Call: 312/998-5065.**

MARCH 8-10
The Role of the Microcomputer in Education IV, Arlington Heights, Il.—Micro-Ideas hosts this seminar with Thursday offering in-depth day-long seminars while Friday and Saturday provide sessions covering a wide range of educational topics. **Call: 312/998-5065.**

MARCH 14-16
Instructional Systems Design Workshop, Washington, D.C.—Designed to provide attendees with an overview of the teaching-learning process and exposure to fundamental learning theory, current instructional concepts and modern educational techniques. **Call: 703/892-4100.**

MARCH 15-16
1984 Microcomputers in Education Conference, Tempe, Az.—The Arizona State University College of Education is sponsoring this conference entitled "Literacy Plus." The conference emphasizes practical, creative ideas for successful computer implementation and findings from research to guide teachers, administrators and others using computers effectively. **Call: 602/965-7363.**

MARCH 16-17
Greater Delaware Association of Educational Data Systems Annual Meeting, Dover, De.—Held in conjunction with the Delaware State Computer Faire, this meeting includes keynote speakers, vendor presentations and exhibits along with training and sharing sessions. **Call: 302/738-6161.**

MARCH 24-26
National Educational Computer and Technology Conference, Chicago, Il.—Featured are exhibits, software demonstrations, seminers and workshops on higher instructional techniques in education. **Call: 202/354-7700.**

MARCH 30
Third Annual Conference on the Use of Technology in Education and Training, Bloomington, Mn.—The conference theme is "Ideas That Work" and will include case studies of successful applications of new technology in education and training. **Call: 612/221-0214.**

MARCH 30-APRIL 1
New York Personal Computer Show, New York, N.Y.—A show for all home, education and small business systems. **Call: 201/297-2526.**

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SEE ATTACHED SHEET FOR SAMPLE PAGE...

TEACHER'S EDITION

E

A Scholastic Skills Book

Basic Computing

by
SHELLEY CHASEN
Gilbert Spruance School
Philadelphia, PA
and
SYLVIA B. COHEN
J. Hampton Moore School
Philadelphia, PA

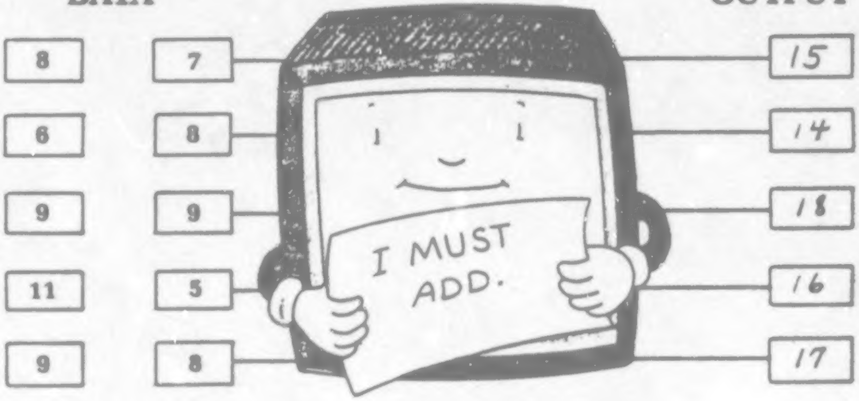
SCHOLASTIC BOOK SERVICES®
New York Toronto London Auckland Sydney Tokyo

WHAT GOES IN? WHAT COMES OUT?

The computer needs information so that it can solve problems. The information that we input into the computer is called data. If we give the computer data, it will use the data to solve problems.

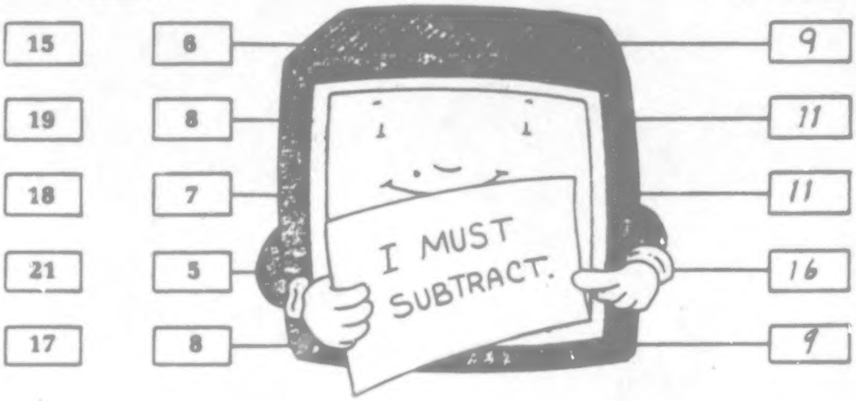
We tell the computer what to do in a program.

A. Tony is using an addition program. He is typing data into the computer. He wants the computer to add numbers for him. Look at Tony's data and write the output that he will get from the computer. The first one is done for you.



DATA		OUTPUT
8	7	15
6	8	14
9	9	18
11	5	16
9	8	17

B. Laura has subtraction problems for the computer. Write the output for each.



DATA		OUTPUT
15	6	9
19	8	11
18	7	11
21	5	16
17	8	9

16

Objectives: Understand input and output [illegible]
Use computer vocabulary.
Key Words: data, program, addition program, [illegible]

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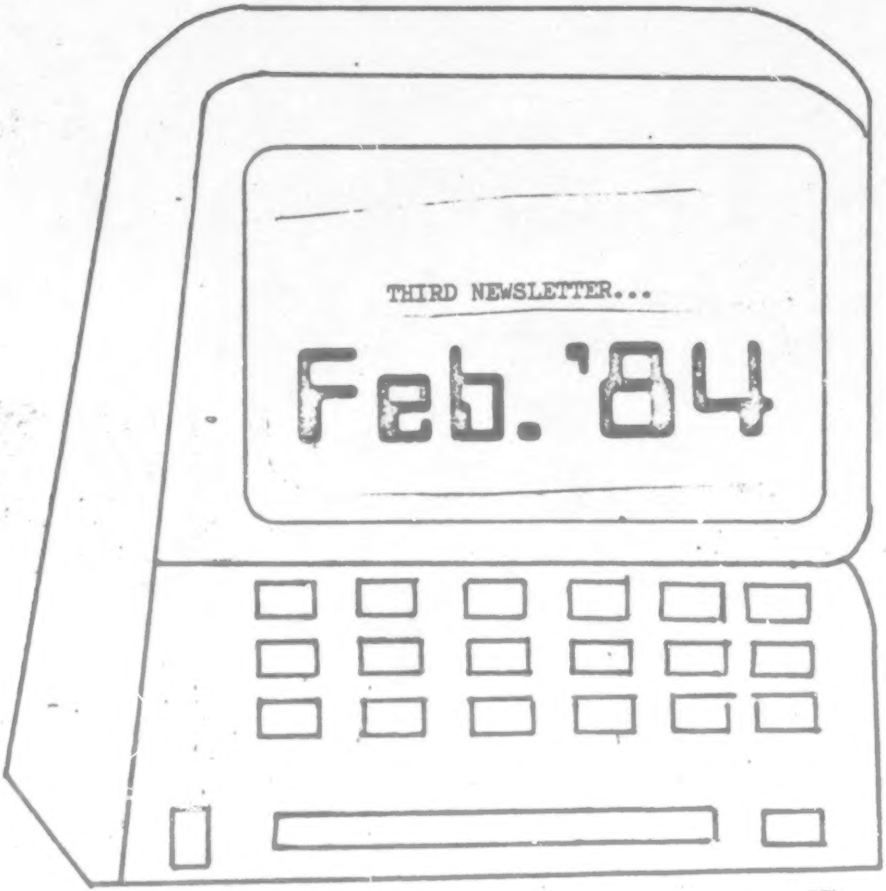
INSTRUCTIONAL COMPUTING

NEWSLETTER

From: Freeman Baggett, Principal

Published by:
English Estates Elementary
Oxford Road
Fern Park, Florida 32730
(305) 831-1416


THIRD NEWSLETTER...
Feb. '84

Greetings,

I hope that this newsletter will be the vehicle that will put you in contact with other educators who are beginning a COMPUTER ASSISTED CURRICULUM. If you have ideas to share, or software that you assess as excellent, please share with me so that I can put your ideas and evaluations in the upcoming newsletters.

Thank you for your cooperation-

Freeman Baggett

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TERMINAL TOPICS

If you are experiencing eyestrain due to your work on the terminal, there are several steps that can be taken to alleviate this problem.

1. Lighting should be dimmer and less direct where you work on your terminal. Bright overhead flourescent lights cast a glare on the screen which leads to eyestrain.
2. Direct sunlight should also be minimized.
3. Use individual desk lights to illuminate papers and other work materials.
4. If you wear glasses and are bothered by glare, try tinted glasses.
5. Take a 5-minute eye break every hour or a 15-minute break every two hours that you work on the terminal.
6. The distance from the eyes to the terminal screen should be the same as that to other work materials.

My system is down

Announcing the Apple Computer Club Merit Awards.

MAIL TO: APPLE COMPUTER CLUBS, 217 JACKSON STREET, LOWELL, MASSACHUSETTS 01852.
Please send a free Apple Computer Club Kit (supply limited to 1 per school) and details on the Apple Computer Club Merit Awards to:

Name ______ Position ______
School Name ______ School Address ______
City ______ State ______ Zip ______
Elementary School Kit ☐ High School Kit ☐

© [illegible] Apple Computer Inc., 20525 Mariani Ave., Cupertino, CA 95014

Up to Data

in the LIBRARY

Computer Literacy(ing)

COMP 46	The Apple Journal of Courseware Review	Apple Education Foundation
COMP 43	Computer Assisted Instruction/Support for the Handicapped	Florida Department of Education, Vol. III-F
COMP 42	Microcomputer Directory: Applications in Educational Settings	Gutman Library
COMP 24	I Speak Basic to My TRS-80	Aubrey Jones
COMP 27	Fifty BASIC Exercises	J. P. Lamoitier
M 308	Computers for Kids: TRS-80	Creative Computing Press
M 309	Computers for Kids: Apple II Plus	Creating Computing Press
M 303	Basic Discoveries: A Problem Solving Approach to Beginning Programming	Creative Publications
M 307	My Friend the Computer	Denison & Co.
M 96	Learning About Computers	Hampden Publications
M 239	Understanding the Computer	Sunburst
M 238	Meet the Computer (TRS 80)	Sunburst

SHARING FROM ORANGE COUNTY NETWORKING EDUCATORS.....

Scavenging For Automation

- To encourage students to become aware of ways people use computers every day, ask them to conduct a "scavenger hunt" for computer-related items. These items might include a receipt from an automated bank teller, a computer-generated letter, photo, or illustration, an expired credit card with magnetic tape on it, a computer-generated ticket stub, a digital watch, a receipt from an automatic cash register, or the cover of an album of computer-generated music.

Popcorn Processing

- Are your students having trouble understanding the computer concepts of input, output, and process? Demonstrate these concepts in a different way by using a popcorn pepper. Explain that "inputting" is like pouring corn into the popper. "Process" is similar to the heating up and popping action going on in the popper. And the popcorn is the output.

ENCHANTED VILLAGE OPENS

The Enchanted Village, a retail store which combines games and toys with educational programming and services-called edutainment-opened its first two branches recently in malls in Pittsburgh, Pa., and Washington D.C.

The stores employ a unique environment that combines the elements of prehistoric village in a futuristic setting. The library, a book selling and reading area, is entered through an enclosed aviary filled with live birds.

The Edutainment concept was developed over a period of ten years by Bernard Tessler, a psycho-therapist, educator, expert on family stress and owner of the stores. "Parents are genuinely concerned with keeping up with educational developments as they affect the cognitive and emotional growth of school age children," says Tessler. "In addition, recent studies indicate that the number one objective of leisure time activities is to spend more time with the family.

TOYS HELP CEREBRAL PALSY VICTIMS

Lee Hallgren, a Honeywell research scientish , is helping to solve the communications problems of children with cerebral palsy with inexpensive electronic toys designed with special switches.

According to Cheryl Waite, who works with Cerebral Palsy Center in Minneapolis, Mn., "The trick is building a switch that will respond to an individual's capablilities. Some of the toddlers at my center have poor muscle tone and coordination, and are also deaf or blind.

"These toys not only offer the children entertainment, they help us teach them to manipulate and interact with their environment," says Waite.

Hallgren works for the Honeywell Corporation in Minneapolis and can be reached by calling: 612/870-2207

FREE CATALOGS

1984 Catalog of Microcomputer Resources. This catalog contains 321 computer-related products for education from 52 publishers including 141 software programs, 180 books and computer classroom supplies. Write: Computer Skill Builders, Dept. EE, P.O. Box 42050, Dept 8E, Tucson, Az, 85733; or call 602/323 7500.

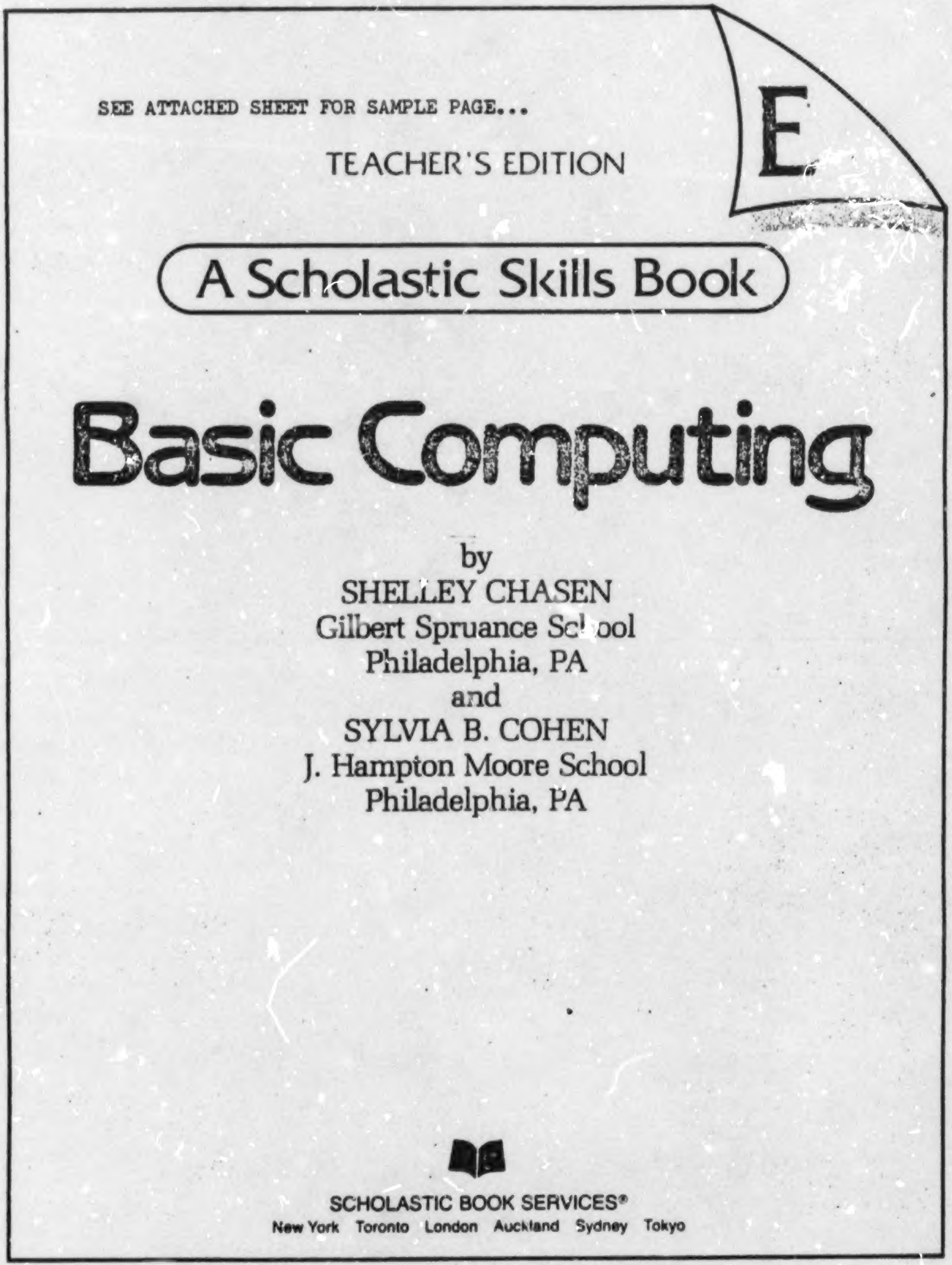
Winter, 1984 Catalog of Educational and REcreational Software. This catalog contains listings for the Acorn, Apple, Atari, Commodore, TRS-80 and IBM-PC. Write: Krell Software Corporation, Dept. EE, 1320 Stony Brook Road, Stony Brook, N.Y., 11790; or call: 515/751-5139.

Software Enhancement Products Catalog. This new 40 page catalog presents numerous products designed to eliminate problems most often blamed on software. Protective devices for smooth software performance include Equipment Isolators, AC Power Line Filter/Suppressors, AC Line Voltage Regulators and Modern Protectors. Write: Electronic Specialists, Inc., Dept. EE, 171 South Main Street, Natick, Ma., 01760; or call; 800/225-4876.

Logo Languages Compared

A comparison of some currently available Logo languages (Developer of version, if different than the producer, is named in brackets; LCSI stands for Logo Computer Systems, Inc. of Montreal, Quebec, Canada).

PRODUCT	PRODUCER	PRICE	COMPUTERS	DEBUGGING AIDS	LIST OPERATIONS	# OF SPRITES	# OF TURTLES	COMMENTS
Apple Logo [LCSI]	Apple Computer 20525 Mariani Ave. Cupertino, CA 95014	$175; $100 until 1/15/84	Apple II, II+ and IIe 64K, disk	Yes	Yes	0	1	Logo toolkit available free at dealers, includes screen print program, text editor
Krell Logo	Krell Software 1320 Stony Brook Rd. Stony Brook, NY 11790	$89.95	Apple II, II+ and IIe, 64K, disk	Yes	Yes	0	1	$325 sprite board available from Krell, allows up to 32 sprites
Terrapin Logo	Terrapin 380 Green St. Cambridge, MA 02139	$149.95	Apple II, II+ and IIe, 64K, disk	Yes	Yes	0	1	$180 sprite board available from Micromint in Cedarhurst, NY
Atari Logo [LCSI]	Atari 1265 Borregas Ave. P.O. Box 427 Sunnyvale, CA 94086	$99.95	All Atari computers, 16K, cartridge	Yes	Yes	0	4	"Dribble" files shape editor, collision detection
Commodore Logo [Terrapin]	Commodore 1200 Wilson Dr. West Chester, PA 19380	$49.95	Commodore 64	Yes	Yes	7	1	Developed by Terrapin, workspace is 25% larger than Terrapin Logo
DR Logo	Digital Research P.O. Box 379 Pacific Grove, CA 93950	$99.95 until April 1	IBM PC, 192K, disk, color graphics	Yes	Yes	0	1	Large workspace, but no TV vertical/horizontal ratio correction
IBM Logo [LCSI]	IBM Cust. Relations P.O. Box 1328 Boca Raton, FL 33432	$175	IBM PC & PCjr, 128K, disk, color graphics	Yes	Yes	0	1	"Dribble" files, shape editor, floating point math, color fill command
PC Logo	Harvard Associates 260 Beacon St. Somerville, MA 02143	$199.95	IBM PC, 64K, disk, color graphics	Yes	Yes	0	1	Communicates with PC peripherals, can use PC's function keys
TRS-80 Color Logo	Radio Shack 1800 One Tandy Ctr. Fort Worth, TX 76102	$49 (cart) $99 (disk)	Radio Shack Color Computer, 16K cartridge 32K disk	No	No	0	256	Includes doodle pad, local area network interface
TI Logo	Texas Instruments Consumer Products Lubbock, TX 79408	$99.95	TI 99/4A, 32K memory expansion unit, cartridge	Yes	Yes	0	1	Look for reduced software prices as the 99/4A is phased out



SEE ATTACHED SHEET FOR SAMPLE PAGE...

TEACHER'S EDITION

E

A Scholastic Skills Book

Basic Computing

by
SHELLEY CHASEN
Gilbert Spruance School
Philadelphia, PA
and
SYLVIA B. COHEN
J. Hampton Moore School
Philadelphia, PA

SCHOLASTIC BOOK SERVICES®
New York Toronto London Auckland Sydney Tokyo

THINKING LIKE A COMPUTER

People are like computers in some ways. In other ways they are very different. Are you like a computer?

A. Circle TRUE or FALSE for each statement.

1. I can think for myself. TRUE FALSE
2. I can do 1,000 addition problems in less than a minute. TRUE [✓ FALSE]
3. I get hungry. TRUE FALSE
4. I never forget anything. TRUE [✓ FALSE]
5. Sometimes I get angry. TRUE FALSE
6. I think E.T. is a good movie. TRUE FALSE
7. I can alphabetize 500 names in ten seconds. TRUE [✓ FALSE]
8. I always do what I'm told. TRUE [✓ FALSE]
9. I can work for hours without getting tired. TRUE [✓ FALSE]
10. Sometimes I get great ideas. TRUE FALSE
11. I feel happy sometimes. TRUE FALSE
12. I never make a mistake. TRUE [✓ FALSE]
13. Sometimes my feelings get hurt. TRUE FALSE
14. I have a sense of humor. TRUE FALSE
15. I can solve problems with words and numbers. TRUE FALSE

You are going to learn many things about computers in this book. Then you will know what would be TRUE or FALSE for a computer too.

Note: Answers will vary. Circled false statements refer to characteristics unique to computers.

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Objectives: Recognize appropriate tasks for computers
Identify characteristics unique to computers

Key Words: *problems, feelings, humor*

LOOKING AHEAD

APRIL 5-7
Third Annual Statewide Alaska Association for Computers in Education Conference, Anchorage, Ak.—Features of this conference include sectionals, vender displays, public domain software exchange and pre-conference workshops. **Call: 907/745-5161.**

APRIL 13-15
Microcomputers and Basic Skills in College, New York, N.Y.—A national conference on the use of microcomputers in postsecondary basic skills instruction such as writing, English as a second language, reading, speech and other areas of developmental education. **Call: 212/794-5425.**

APRIL 25-28
Sixty-Second Annual Meeting, San Francisco, Ca.—The National Council of Teachers of Mathematics is sponsoring this conference with the theme "Using Technology in Mathematics Education." **Call: 703/620-9840.**

MAY 5
Sixth Annual Computer Conference, Cambridge, Ma.—This conference focuses on all aspects of computer use in kindergarten through twelfth grade. **Call: 617/868-9600.**

MAY 7-11
1984 Annual Association for Educational Data Systems (AEDS) Convention, Washington, D.C.—"Captol-izing on Computers in Education" is the theme of this 22nd annual convention sponsored by AEDS. Planned topics include educational administration, instruction, research, computer literacy, computer science, hardware innovations, software development/evaluation, student records management, micros in education, applications for the handicapped and systems planning. **Call: 202/822-7845.**

MAY 7-11
Tutorials for Professional Development, Chicago, Il.—This will consist of two tracks, one on the subject of Software Engineering and the other on Networks and Communications. **Call: 301/589-8142.**

MAY 14-18
Association for the Development of Computer-Based Instructional Systems (ADCIS) Twenty-Fifth International Conference, Columbus, Oh.—The ADCIS is sponsoring this conference with the theme, "Courseware Portability." **Call: 206/676-2860.**

MAY 16-18
National Council of Teachers of Mathematics Microcomputer Seminar, Miami, Fl.—Elementary, intermediate and secondary school educators will be introduced to the microcomputer and its use in teaching mathematics. **Call: 703/620-9840.**

MAY 20-25
Fourth Jerusalem Conference on Information Technology, Jerusalem, Israel—Covers a broad range of topics on computer technology and applications. It will also explore the economics and management of the information industry. **Call: 215/898-8521.**

MAY 23-24
1984 Trends and Applications Conference, Gaithersburg, Md.—Cosponsored by the National Bureau of Standards and the IEEE Computer Society, the theme of this conference is "Making Databases Work." Presentations will address current systems and applications as well as ongoing research into advanced concepts. **Call: 301/589-8142.**

JUNE 13-15
1984 National Education Computing Conference, Dayton, Oh.—The University of Dayton is sponsoring this conference to help attendees keep up-to-date on the most current activities in educational computing. **Call: 212/869-7440.**

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INSTRUCTIONAL COMPUTING

NEWSLETTER

From [illegible]

[illegible] by:
[illegible] Elementary
[illegible]
Fern Park, Florida 32730
(305) 831-1410

BOOK REVIEWS

A Glimpse of the Future

BRAVE NEW SCHOOLS

By Glenn M. Kleiman: Reston Publishing Co., Reston, VA; $14.95

IN HIS BOOK *BRAVE NEW Schools*, Glenn Kleiman takes the reader on a guided tour of the Babbage School, a fictional school in the not-too-distant future. Kleiman, a columnist for *Compute!* magazine, shows what a school would look like if all of the best applications of computers that exist today were melded into one educational environment. His narrative is readable and organized, highlighting the positive uses of computers as educational tools. But he manages to balance his enthusiasm by pointing out the other side of some of these computer applications—their disadvantages, difficulties, and drawbacks.

As we tour the school, we see students (aged 7-14) using computer programs in all aspects of the curriculum, including music, art, language arts, science, and special education. They use computer programs in the form of games, tutorials, simulations, and drills. Beyond describing these student activities, Kleiman presents a primer on the structure and function of a typical computer system, and a cross-referenced index to all of the programs he mentions over the course of the book.

FOR YOUNG STUDENTS

KIDS COMPUTER IQ BOOK, BY Eileen Buckholtz and Dr. Joanne Settel: Bobbs-Merrill, 4300 West 62d St., PO Box 7080, Indianapolis, IN 46206. ($5.95) This introduction to computers for eight- to twelve-year olds contains specific instructions for Apple, TRS-80, Atari, VIC-20, Commodore 64, TI 99/4A, and Timex 1000 micros.

SING A SONG OF SOFTWARE, BY Leonard J. Soltzberg: William Kaufmann, Inc., 95 First St., Los Altos, CA 94022. ($8.95) Poems about computers, software, and programs, with computer-generated graphics.

EDUCATION IN THE COMPUTER Age: Issues of Policy, Practice, and Reform, by Stanley Pogrow: SAGE Publications, Inc., 275 South Beverly Drive, Beverly Hills, CA 90212. ($25) Pogrow argues that substantial educational improvements can be made in the public schools through creative and well-planned use of computers—without eliminating teachers, redesigning curricula, or straining budgets.

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HANDS ON!

Two programs introduce young students to word processing and computer graphics.

HARDWARE:	Color Computer (32K)
SOURCE:	Children's Television Workshop/Radio Shack Education Division 1400 One Tandy Center Fort Worth, TX 76102
PRICE:	$99
PREVIEW:	Previewing is possible at Radio Shack computer centers or through regional coordinators
BACKUP:	Backups for archival purposes allowed

DESCRIPTION: THE FIRST lesson in computer literacy, at least the way it's taught in *Hands On!*, is to treat the computer as a blank screen for self-expression. Using this program's two learning modules, "Blackboard" and "Color It," students write and draw their way to a beginning understanding of how the computer operates and the functions it can perform.

Each module is well-equipped with disks, worksheets, activity cards, a gameboard, and a poster.

Students can use the modules on one of three levels. The teacher determines a specific level for each student with the "Learning Manager" component of the program.

Apple II+, Apple IIe

COURSEWARE

"DISCOVER INTENSIVE

PHONICS

FOR YOURSELF"

- PROVEN METHOD adapted to computer from course developed by Charlotte Lockhart
- For use in Primary Schools, Special Ed. and any age with READING DISABILITIES.
- HUMAN VOICE audio tapes played on std. tape player under computer control.
- Automatic student performance recording and reporting on screen or in print.
- 48 lessons, 10 diskettes, 24 audio cassettes and an interface board.
- Will be adapted to other computers.

HEC SOFTWARE, Inc.

3471 South 550 West, Bountiful, UT 84010 Ph. 801/295-7054

Apple II and Apple IIe are trademarks of Apple, Inc.

CIRCLE 28 ON READER SERVICE CARD

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LOOKING AHEAD

MAY

LESLEY COLLEGE AND THE COMputer Education Resource Coalition (CERC): Annual Computer Conference for Educators in Cambridge, MA, on May 5. Presentations by teachers, researchers, and software producers; hands-on workshops; a panel of educators who have moved into the private sector. Contact Susan Friel or Nancy Roberts, Lesley College, 29 Everett St., Cambridge, MA 02238. (617/868-9600)

INTERNATIONAL READING ASSOciation: Annual Convention in Atlanta, GA, on **May 6-10**. Theme is "Reading in an Information Age: 1984 and Beyond." Over 400 sessions on topics such as comprehension, Chapter 1, computers and reading, and children's literature. Five hundred exhibit booths. Contact Drew Cassidy, IRA, 800 Barksdale Rd., PO Box 8139, Newark, DE 19714. (302/731-1600)

THE ASSOCIATION FOR EDUCAtional Data Systems (AEDS): Annual Convention in Washington, DC, on **May 7-11**, titled "Capitol-izing...On Computers in Education." Presentations, panels, tours, and a computer fair for students. Contact Linda Corso, AEDS, 1201 16th St. NW, Washington, DC, 20036. (202/822-7845)

ASSOCIATION FOR THE DEVELopment of Computer-based Instructional Systems: Ohio State University will host the 25th International Conference in Columbus, OH on **May 14-17**. The conference will focus on courseware portability. Contact Dale Brubeck, Division of Computing Services, OSU College of Medicine, 076 Health Services Library, 376 W. 10th Ave., Columbus, OH 43210. (614/422-6192)

NATIONAL EDUCATIONAL COMputer Library: Educational Computer Conferences in three locations: Atlanta, GA on **May 31-June 2**, Philadelphia, PA on **June 14-16**, and Chicago, IL on **June 28-30**. All will feature exhibits, software demonstrations, seminars, and workshops. Contact NECOL, PO Box 792, Torrington, CT 06790. (203/489-2728)

JUNE

National Educational Computing Conference: Annual meeting, in Dayton, OH, on **June 13-15**. Exhibits, presentations, and panels directed at teachers and administrators from K through college-level. Preconference workshops, **June 11-12**. Contact Lawrence A. Jehn, University of Dayton, 300 College Park, Dayton, OH 45469.

JULY

COMPUTERS IN SCHOOLS INSTItute: In Santa Clara, CA on **July 10-12**, this conference includes field trips to Silicon Valley computer companies. Contact Doris Prince, Santa Clara County Office of Education, 100 Skyport Dr., San Jose, CA 95115. (408/947-6538)

AUGUST

THE CENTER FOR ADVANCED Technology in Education: Annual Conference at the University of Oregon's College of Education in Eugene, **August 1-3**, titled "The Computer: Extension of the Human Mind." Focuses on the needs of the individual responsible for school and district level use of computers and other instructional technologies. Group sessions, vendor exhibits, film-video theater, and pre- and postconference workshops on the educational uses of computers. Contact Summer Conference Office, College of Education, University of Oregon, Eugene, OR 97403. (503/686-3460)

ORANGE COUNTY SHARES.....

FILM

Free Computer Film: A 16mm film called "This Business of Numbers," is available on free loan to elementary schools from Sperry-Univac. The film uses animated cartoons to describe the development of numbers from the caveman to modern data processing. Contact Karol Media, 625 From Rd., Paramus, NJ 07652.

Handbooks on Finding Free Software: Enrich/Ohaus has handbooks available for $8.95 each that list sources of free software for a particular computer. Handbooks are available for free software for the Atari family (400, 800, 1200), Commodore 64 and Vic-20, Apple II family, and TI 99/4A. One for the IBM PC and PCjr will be available in May. Contact: Enrich/Ohaus, 2325 Paragon Dr., San Jose, CA 95131.

CLASSROOM AIDS

Free Posters: You can get a computer poster to hang in your classroom or computer room every month when you subscribe to either *Teaching and Computers* (published by Scholastic, Inc. 730 Broadway, New York, NY 10003) or *Classroom Computer Learning* (published by Pitman Learning, Inc., 19 Davis Dr., Belmont, CA 94002). Both magazines also offer ideas for classroom computer use. *Teaching and Computers* is aimed at teachers in grades K-8.

Quick Reference Guides: These four-panel reference cards (6"x12") give quick references on programming symbols, statements, commands, and controls. Available from John Wiley & Son, Inc., 605 Third Ave., New York, NY 10158 (price: $2.95) for the VIC 20, Commodore 64, and Timex Sinclair 1000.

Computer jobs: Almost 10,000 new types of jobs have been created in the last 25 years, and most of them require the use of computers. The U.S. Bureau of Labor Statistics predicts that out of all jobs, computer-related jobs will grow the fastest, have the highest salaries, and the largest number of jobs opening up during the 1980's. By next year, in fact, 7 out of every 10 adults who work will use a computer on the job.

Who were the youngest founders of a computer company? Probably Steve Grimm and Nikolai Weaver. They were 11 years old when they started Plum Software in Los Gatos, CA in 1981.

Home is where the computer is: By the end of the decade, some surveys predict, nine out of ten American households will have at least one home computer. Right now, *more* than 90% of all households already contain computers inside toys and appliances.

1. Did you become more knowledgeable of CAI from reading these newsletters (4 newsletters on all)?

_____ yes _____ no

2. Would you want these nowsletters, or communications like this continued?

_____ yes _____ no

3. Was it helpful to cross-county communicate Orange/Seminole?

_____ yes _____ yes

4. What was the most helpful section of the newsletters: (number in order of importance with #1 being most important).

_____ free material

_____ conference dates/updates

_____ helpful hints

_____ evaluation of software

5. List your comments regarding the newsletters.

____

____

____

____

____

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APPENDIX Q

Standards of Basic Skills

Communication Skills

A. Identify printed equivalents to orally presented words.

Associate words with words of opposite meaning.

Associate contractions with their component words.

B. Identify specific details in a selection.

Determine the stated effect of an action.

Identify story outcomes.

C. Distinguish between real and unreal.

Identify an irrelevant sentence in a selection.

Follow written directions to complete a task.

Put words in alphabetical order by first letter.

Writing Skills

B. Classify objects under appropriate headings.

Arrange four pictures in a sequential pattern.

C. Dictate a logical sequence of events from pictures.

I. Capitalize the first word in a sentence.

Math Skills

A. Count up to 100 objects.

B. Read and write numbers less than 100.

C. Add three 1-digit numbers (sum less than 19).

E. Identify halves, thirds, or fourths.

F. Add two 2-digit numbers (no carrying).

G. Subtract basic combinations (subtraction facts).

Subtract 1-digit from 2-digit numbers (no borrowing).

Subtract 2-digit numbers without borrowing.

O. Tell time on the hour and half-hour.

Determine the length of an object.

Q. Identify sets of coins equal in value.

T. Solve word problems involving addition.

Solve word problems involving subtraction.

V. Subtract to solve practical money problems under $.50.